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MAPPING INDUSTRIAL PRODUCTION IN TANZANIA

A DISAGGREGATED ANALYSIS BASED ON THE 2013 MAINLAND CENSUS

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Mapping industrial production in Tanzania
A disaggregated analysis based on the 2013 mainland census

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1. Tanzania: A country at a crossroads

Tanzania is a fast growing economy, with the rate of its development outpacing the average sub-Saharan African growth rate since 2005. While the rate of growth is certainly of significance, the *Tanzanian Development Vision* (TDV) and the *Long Term Perspective Plan* (LTPP) recognize that manufacturing-led structural transformation is the only path towards a more inclusive society, sustained economic growth and a sustainable economic system. Tanzania has taken important steps in this direction since 2000 by promoting a number of policy strategies targeting various sectors and increasing support for these. The *Second Five Year Development Plan* (FYDP II 2015/16 – 2020/21) is centred around the need to boost industrialization and productivity growth across the economy, targeting light manufacturing and resource-based industries in particular. The dual policy goal is to create—both directly and indirectly—more and better jobs via manufacturing development and the industrialization of the agricultural sector[1].

With the Second Five Year Development Plan, Tanzania has entered the most critical stage of the long-term journey envisioned in the TDV and LTPP. As highlighted in the *Tanzanian Industrial Competitiveness Report 2015/16*, the Tanzanian economy is at a critical crossroads. In 2013, the contribution of manufacturing to Tanzania's GDP was 8.13 per cent, lower than in other countries such as Kenya (9.4 per cent), South Africa (14.9 per cent) and Mozambique (11.4 per cent). Since 2010, while the country has continued registering increases in its overall manufacturing value added (MVA), the speed at which the manufacturing sector is expanding has slowed down significantly. The average annual growth rate of Tanzania's MVA has declined from roughly 9 per cent during the first decade of 2000 to under 6 per cent for the years between 2010 and 2013. The MVA per capita growth rate has also registered a significant deceleration from an average growth rate of 5.4 per cent annually in the period 2005-2010, to 2.7 per cent annually in the period 2010-2013. During the same period, the service sector grew at an average rate of 7.5 per cent annually, while agriculture registered a weaker performance with an average growth rate of 3.3 per cent. The considerable slowdown in

[1] For an analysis of industrial development and policy trajectory in Tanzania, see (Gray, 2013), (Wangwe et al 2014) and (Andreoni, 2017). For a discussion on the key role of manufacturing in structural transformation, see (Haraguchi, 2017), (Andreoni and Chang, 2016) and (Andreoni, 2018).

the MVA growth rate raises a critical policy question around the quality of structural transformation that Tanzania has experienced since 2010[2].

While the first decade of the century was characterized by sustained manufacturing expansion, this process did not lead to broader economic diversification and technological upgrading, at least until 2013. If we consider the relatively longer five-year cycles between 2008 and 2013, the share of medium and high tech products in MVA registered a downward trend. This drop was determined by the slashing of production of chemicals and chemical products, as well as rubber and plastics, which accounted for 95 per cent of all medium and high tech production in 2008.

Table 1 Manufacturing value added in Tanzania and comparators

	Manufacturing Value Added constant 2005 USD (in million)					Compound Annual Growth Rate (%)	
	2005	**2010**	**2011**	**2012**	**2013**	**2005-2010**	**2010-2013**
Ethiopia	601	944	1,031	1,153	1,348	9.46%	12.61%
Viet Nam	10,848	16,897	18,756	19,844	21,320	9.27%	8.06%
Zambia	820	1,029	1,111	1,191	1,245	4.65%	6.56%
Rwanda	145	197	213	226	236	6.34%	6.14%
Tanzania	1,235	1,897	2,029	2,112	2,249	8.96%	5.84%
Mozambique	924	1,109	1,129	1,237	1,263	3.72%	4.43%
Kenya	1,974	2,332	2,501	2,487	2,626	3.39%	4.04%
Uganda	632	883	952	978	954	6.93%	2.59%

Source: World Development Indicators

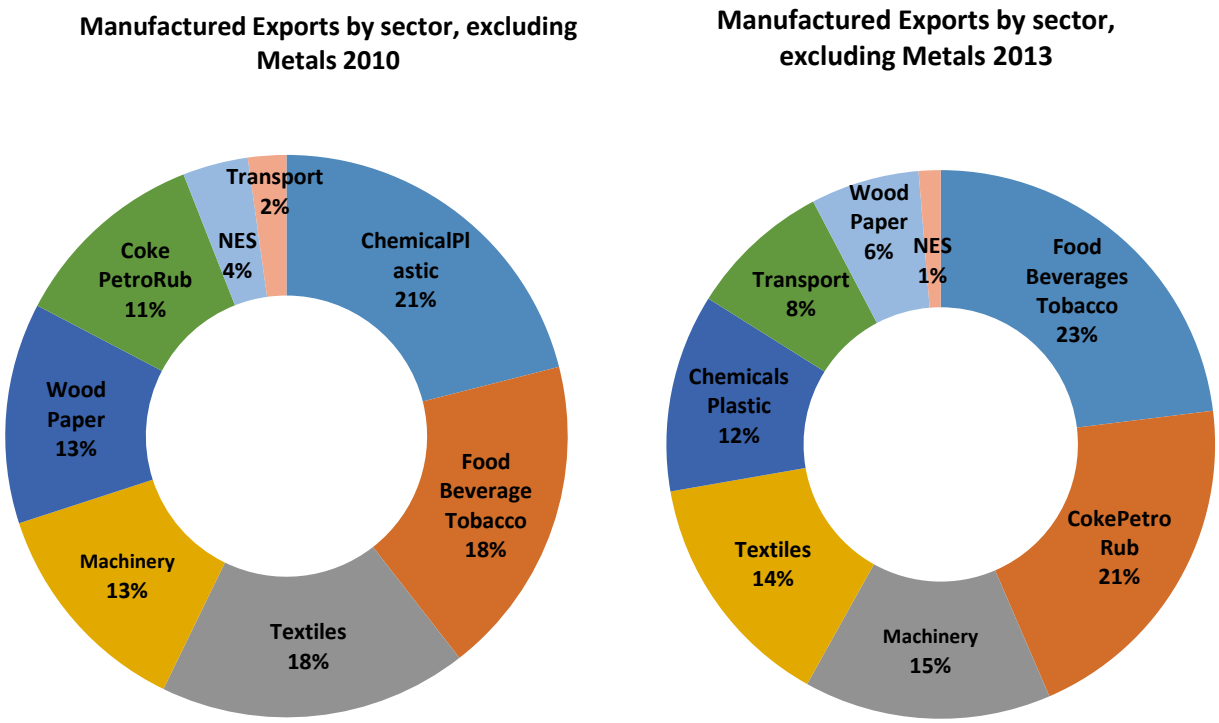
These trends are also reflected in Tanzania's manufacturing export performance. From 2000 to 2010, Tanzania's manufactured exports have been growing rapidly at 31 per cent annually on average. However, while between 2010 and 2012 Tanzania's

[2] See McMilland Rodrik, 2011.

manufactured exports continued to grow, they dropped significantly between 2012 and 2013. This has caused a negative average annual growth rate of - 8 per cent since 2010, which resulted in a decrease of manufacturing exports by USD 9 per capita.

In terms of the composition of the export basket, while metal products made up a substantial share of manufacturing exports (54 per cent) in 2010, in 2013, they only contributed 30 per cent of total manufactured exports. The shrinking of metallic industry exports is attributable to declining base metals exports from 27 per cent in 2010 to 1 per cent in 2013, as well as metal waste exports. Additionally, the export of precious metals fell by one-third. Since 2010, the food, beverages and tobacco industry has emerged as the most important contributor to manufacturing exports (e.g. sharp growth in the sugar and honey product group), followed by exports of petroleum products, which have grown by 81 per cent since 2010. Overall, Tanzania's exports include a low share of manufactured products (roughly 38 per cent), as well as a low share of medium and high tech (MHT) products among its manufactured exports (25 per cent) (Figure 1).

Figure 1Composition of manufacturing exports, excluding metals



Source: UN Comtrade

These emerging MHT productive industries are critical for complementing more traditional primary product exports. While Tanzania needs to boost agro-processing and resources beneficiation to increase value added, these manufacturing products offer new value capture opportunities. Primary exports tend to be highly vulnerable to market shocks due to volatile international demand and price changes that are beyond domestic control, and their values are generally lower than that of processed goods.

2. Mapping industrial production: towards a disaggregated analysis of industrial production and organization in Tanzania

In 2013, the Tanzanian National Bureau of Statistics (NBS), in collaboration with the Ministry of Industry, Trade and Investment (MITI), Confederation of Tanzania Industries (CTI) and UNIDO, conducted the fourth Census of Industrial Production (CIP, 2013) in mainland Tanzania. The first census was carried out in 1963, the second in 1978 and the third in 1989. The results of the last census were published in September 2016. The CIP is the most comprehensive and updated dataset on industrial production in mainland Tanzania, covering both small and large establishments. The CIP defines *small establishments* as those engaging between 1 and 9 people, while *large establishments* are those that engage 10 or more people. According to the CIP, out of a total of 49,243 establishments recorded in 2013, 47,921 (97.3 per cent) were small and 1,322 (2.7 per cent) were large.

The census covered all large establishments for a total of 1,322 production units and a sample of small establishments for a total of 12,297 units. The census involved establishments that were active in 2013, that is, the information requested and shared by establishments was based on the financial year covering January to December 2013. The industrial statistics covered a broad set of industrial, economic, institutional and social variables. Establishments were classified into industries based on their major activity conforming to the International Standard Industrial Classification (ISIC) Revision 4. Each industrial activity was defined in terms of its principal products or services that had the highest share of the establishment's total value added.

The MIT found that the CIP is an essential "tool" for industrial policy planning, as it allows for evidence-based policy formulations. It also provides a baseline for monitoring and evaluating policy effectiveness in the short, medium and long term. It

thus offers a platform for adaptive policymaking and policy learning, especially when integrated into a panel dataset for longitudinal analysis. This tool is also flexible, i.e., the collected data can be used and calibrated in different ways according to the specific policy needs and targets. This calibration depends primarily on:

(i) *aggregation criteria* adopted – the degree of disaggregation at which data are presented;

(ii) type of *industrial statistics* used –how different variables are identified and analysed in a meaningful way to capture specific industrial and economic phenomena;

(iii) type of *economic hypotheses* adopted to link different variables—performance and driver indicators—and for analysing potential relationships among them.

In the CIP 2013, the data were elaborated based on a set of standard industrial statistics, and were presented in aggregate forms according to three main set of parameters, namely:

(i) different industrial activity and manufacturing sub-sectors (ISIC Rev.4);

(ii) different regions in mainland Tanzania;

(iii) two main types of production units, that is, small and large establishments.

The first parameter allows for an analysis of industrial input and output performance in different industrial activities and sectors of the economy. The second parameter allows for capturing industrial concentration in the different regions of the country. With the third parameter, two extremely different types of production units can be distinguished, that is, those operating with less than 10 employees—small establishments—from the rest of the larger establishments. In a limited number of cases, some variables were presented in a more disaggregated form, for example, by identifying other subgroups of establishments within the two broad groups of small and large establishments.

2.1 Census of industrial production 2013

The CIP provides an in-depth statistical analysis of the Tanzanian industrial landscape at the end of 2013. The analysis of the main statistical results leads to the following industrial map of mainland Tanzania.

The organization of industry is characterized by the following features[3]:

1) **Small, recently established, privately-owned and independent firms**: the Tanzanian industrial sector is mainly composed of small establishments, accounting for 97.3 per cent of the total amount of 49,243 establishments. There are only 1,322 large establishments with more than 10 employees, of which 998 operate in the manufacturing sector. Among the large establishments, nearly half (569) were established after 2005 (more than half, 779 establishments, if we taker the year 2000), while only 231 began operating before 1990. The industrial sector is also dominated by single and independent production units, 81.8 per cent in the case of large establishments and 98.3 per cent in the case of small ones. Finally, 99.6 per cent of small establishments are privately owned while among large establishments, 85.2 per cent are privately owned, 11.0 per cent are publicly owned; and 3.8 per cent of the establishments have a mixed ownership (private and public).

2) **Establishments operating in manufacturing sub-sectors**: Out of all establishments, the manufacturing sub-sector had the largest number of establishments (48,474, i.e. 98.4 per cent); followed by mining and quarrying (391, i.e. 0.8 per cent); water supply, sewerage, waste management and remediation activities (227, i.e. 0.5 per cent); and electricity, gas, steam and air conditioning supply with 151 establishments, i.e. 0.3 per cent.

3) **Regionally concentrated industrial and manufacturing firms**: The Dar es Salaam region had the largest number of establishments (7,443, i.e. 15.1 per cent); followed by Mara with 3,549 establishments, i.e. 7.2 per cent; Ruvuma (3,477, i.e. 7.1 per cent); and Morogoro (3,077, i.e. 6.2 per cent).

[3] (Sutton and Olomi, 2012) provides an historical account of the largest firms in Tanzania. See (Roberts, 2016) for an analysis of competition in different sectoral value chains in southern and eastern Africa.

The performance of the industrial sector is characterized by the following features:

1) **MVA largely produced by large establishments**: Large manufacturing firms contribute 57.9 per cent (TZS 4,552,716 million) of the total value added generated in the industrial sector, followed by mining and quarrying (37.1 per cent). While the number of small establishments is significantly higher, their total value added in manufacturing (TZS 355,275 million) is less than one-tenth of the value added contributed by large firms.

2) **MVA concentrated in seven manufacturing sub-sectors:** Large establishments in food products, beverages and tobacco contribute 38.7 per cent, 22.4 per cent and 9 per cent, respectively, of total value added. If we include large establishments from the other four manufacturing industries, namely non-metallic mineral products (6.7 per cent), rubber and plastics (4.1 per cent) and textiles (3.6 per cent), we reach 85 per cent of MVA produced by the entire industrial sector in mainland Tanzania.

3) **Industrial and manufacturing value added concentrated in five regions:** Seventy-five per cent of industrial value added is produced in five regions, namely Dar es Salaam (27.6 per cent), Morogoro (12.8 per cent), Mara (12.8 per cent), Shinyanga (11.2 per cent) and Geita (10.6 per cent). However, 65.9 per cent of MVA comes from two regions only, Dar es Salaam (43.1 per cent) and Morogoro (21.8 per cent). If we consider the other three manufacturing hubs, Arusha (7.4 per cent), Tanga (5.4 per cent) and Mwanza (5.7 per cent), we find that 84.4 per cent of MVA is concentrated in the top five manufacturing regions in mainland Tanzania.

The drivers of Tanzania's industrial performance are characterized by the following features:

1) Employment is concentrated in manufacturing industries and employment creation is primarily driven by large establishments: During 2013, a total of 138,887 persons (52.6 per cent) were engaged in large industrial establishments while 125,336 (47.4 per cent) worked in small establishments. Manufacturing

industries employed 231,098 people, that is, 87 per cent of the total industrial sector.

2) **Production capacity utilization remains low across a number of industries:** The average production capacity utilization is only 63 per cent due to a number of factors, including insufficient power supply, insufficient domestic demand, competition from imports, high costs of credit and poor transport facilities/high transport costs.

3) **Investments in fixed assets are mainly concentrated in infrastructure supply:** Total expenditure on fixed assets in 2013 was TZS 63,220,390 million, out of which 85.4 per cent was spent on electricity, gas, steam and air conditioning supply; while the remaining three sub-sectors spent 14.6 per cent of the total expenditure on fixed assets.

4) **Among large establishments, production input costs are overwhelmingly dominated by raw materials:** The total cost of inputs was TZS 10,323,121 million; the highest cost of inputs was for materials and supplies purchased for TZS 5,811,205 million (56.3 per cent); followed by other expenses such as interest and dividends paid, income tax at TZS 1,769,122 million (17.1 per cent) and energy at TZS 1,549,122 million (15.0 per cent).

2.2 Structural heterogeneity: regions, industries and establishment types

The CIP report highlights a fundamental feature of Tanzania's industrial system in Tanzania, namely its high degree of *structural heterogeneity*[4]. This means that industrial and manufacturing firms are not equally distributed across the country and the different industrial sectors. This is why it is important to produce different industrial statistics for different regions and industries. However, and more crucially, even within the same regions and industries, the CIP's main results summarized above indicate that the output performance of small and large establishments differ completely, and they face very different challenges in terms of effective access and use of different industrial drivers, including skilled labour, production capacity and raw materials. In the context of high

[4] Andreoni and Chang, 2016 introduces and discusses the concept of "structural heterogeneity" in the context of manufacturing development.

structural heterogeneity, the use of appropriate aggregation criteria and industrial statistics are critical for capturing the different strengths and challenges of the different productive forces in the economy. Ultimately, the effectiveness of an industrial policy will depend on its capacity to target and diversify its interventions by both addressing specific challenges faced by a certain group of establishments as well as leveraging their specific strengths.

Given the high concentration of MVA, employment generation per production units, and the role large establishments play in major industries in Tanzania, the adoption of a more disaggregated taxonomy for the large establishments group (firms with 10+ employees) is particularly relevant for industrial policymaking. Indeed, industrial statistics based on averages for the overall group of large establishments like those presented in the CIP might be misleading as they do not allow policymakers to capture the major differences within the broad group of large establishments. In the CIP, the large establishments group includes production units which exceed the 10+ threshold by only a few employees (that is, they are still relatively small establishments), as well as establishments with hundreds of employees, far beyond the 10+ threshold. Industrial statistics averaging the performances of these completely different production units are difficult to interpret as they lack the structural heterogeneity characterizing the staff of large establishments.

In 2013, among the large establishments group, the distribution of manufacturing firms of different sizes measured by the number of employees is particularly skewed (Table 2). For a total of 998 large establishments, 682 (68 per cent) had less than 50 employees, while there were only 38 establishments (4 per cent) with more than 500 employees. The number of manufacturing establishments with 50 to 99 employees was 127 (13 per cent), while there were 151 (15 per cent) firms with 100 to 499 employees.

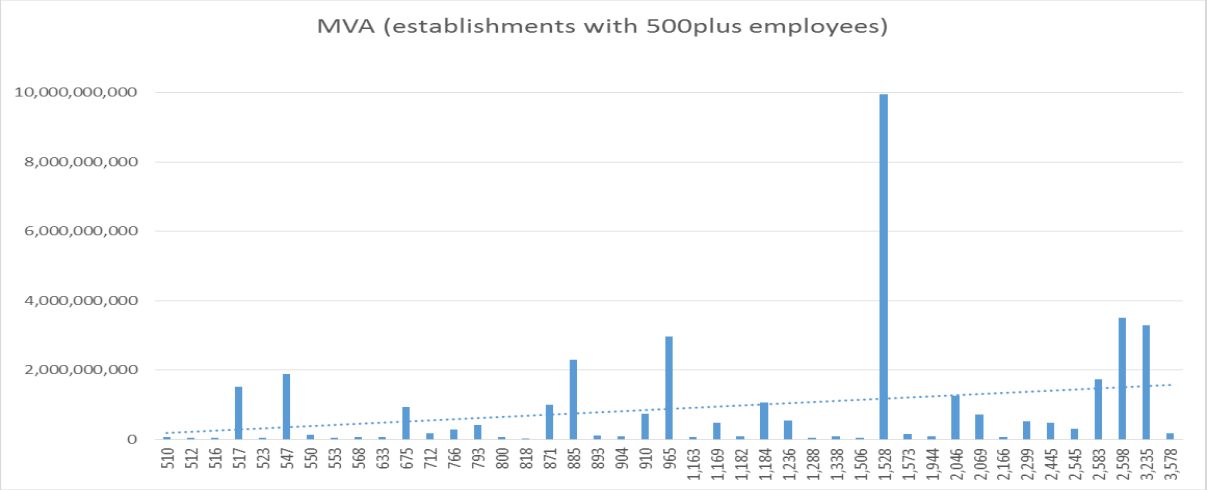
Table 2 Distribution of establishments based on employment size

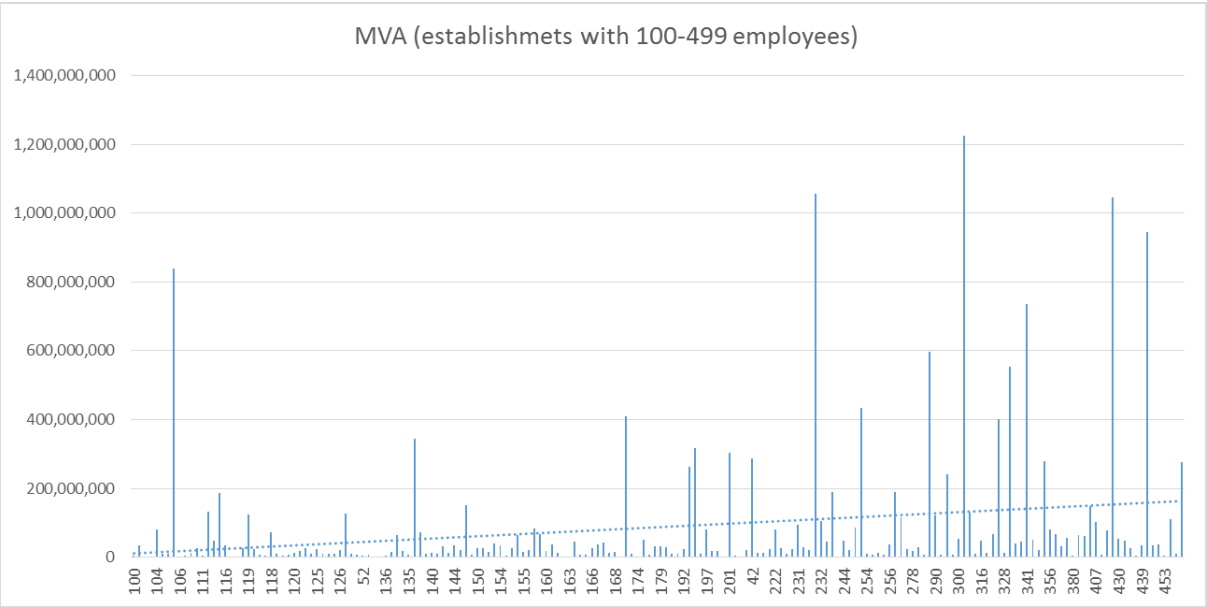
ISIC Rev.4	Industrial Activity	Employment Size							Total
		1 - 4	5 - 9	10 - 19	20-49	50-99	100-499	500+	
B	**Mining and quarrying**	77	105	69	90	21	23	7	391
C	**Manufacturing**	41,656	5,820	**391**	**290**	**127**	**151**	**38**	48,474
D	**Electricity, gas, steam and air conditioning supply**	109	15	0	4	4	16	3	151
E	**Water supply; sewerage, waste management and remediation activities**	78	62	33	28	18	9	0	227
	Total	41,919	6,002	493	412	170	199	48	**49,243**

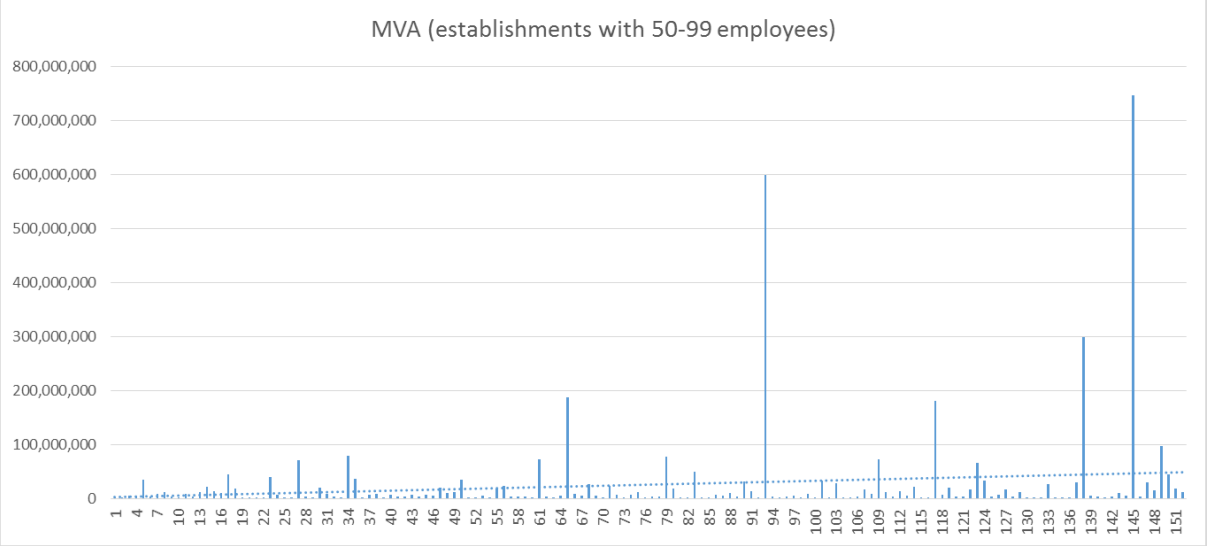
Manufacturing establishments of different sizes are also distributed differently among different industries as well as regions in Tanzania. There are industries dominated by firms with hundreds of employees, while in the other industries, the great majority of establishments are much smaller in terms of number of employees. Manufacturing establishments of varying employment sizes also tend to produce different levels of MVA in terms of total value added, but often also in per capita terms, suggesting the presence of economies of scale and differences in productivity. The average MVA for establishments with 500+ employees reached TZS 875 million, while the average MVA for establishments with 100 to 499 employees was around TZS 88 million, that is, 10 per cent of the average MVA among 500+ establishments. The average MVA for establishments with 50-99 employees was about TZS 25 million; TZS 5.2 million for establishments with 20-49 employees; and finally, TZS 1 million for establishments with 10-19 employees.

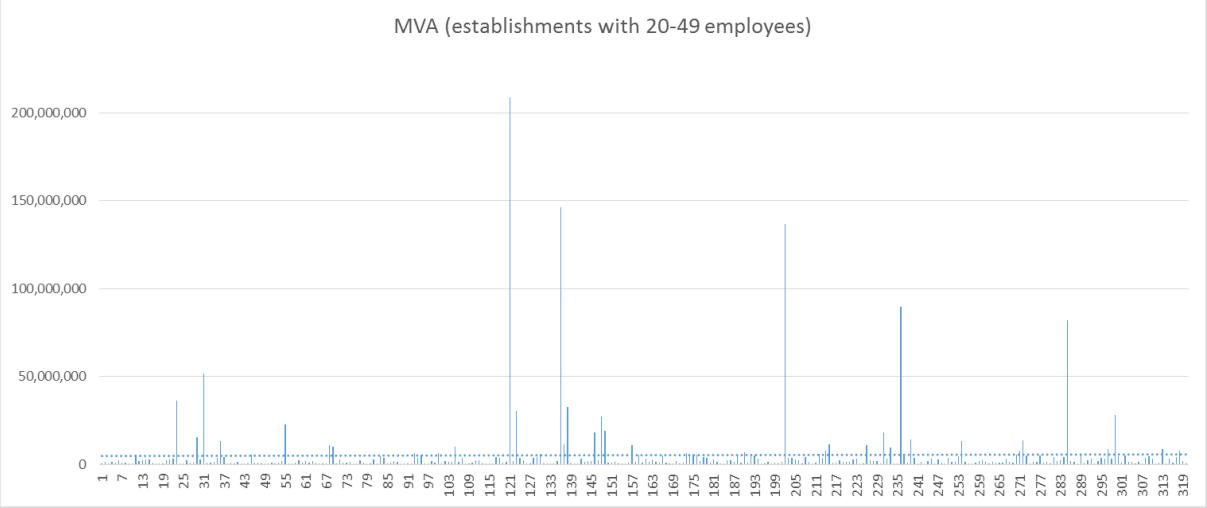
Figure 2 provides empirical evidence of the structural heterogeneity of the manufacturing sector as revealed by the differences in average MVA for different establishment types. For each group, the establishments were ranked by the smallest to the largest, and the total MVA for each establishment was plotted. The figure shows the different levels of MVA characterizing the different establishment groups, as well as how MVA tends to grow with the increasing size of the establishment, in particular, when establishments exceed the threshold of 100 employees.

Figure 2Structural heterogeneity in terms of MVA









2.3 Methods

To better capture the differences between establishments in relation to key industrial variables, such as production capacity utilization or value added performance, further sub-groupings of establishments were adopted in the analysis of industrial production. Hence, for the group of large establishments (10+ workers) a number of more disaggregated statistics are presented and analysed in this paper. Specifically, the group of medium establishments (10-99 workers) is disaggregated in three groups, namely *small-medium establishments (10-19)*, *medium establishments (20-49)* and *medium-large establishments (50-99)*; while the group of large establishments (100+ workers) is divided into two further groups, that is, *large establishments (100-499 workers)* and *major establishments (500+ workers)*. In accordance with the Tanzanian Small and Medium Enterprise policy, the

group of small establishments also includes separate statistics for *micro establishments (1-4 workers)* when required. The establishment grouping adopted in the census and the present study is summarized below (Table 3).

The adoption of this taxonomy allows for the extraction of more disaggregated information on the existing constraints and performances in the industrial system and consequently, better analysis and evidence for the design of targeted industrial policy measures. By adopting this taxonomy and constructing industrial statistics focusing on the performances and drivers of Tanzania's industrial system, the following analysis complements the existing CIP report and extracts a number of policy recommendations for more targeted and effective policy interventions[5]. It also advances a number of recommendations for monitoring and evaluating the existing policies, pointing to data and policy-relevant industrial indicators.

Table 3 Taxonomy of productive establishments by employment size in Tanzania

<table>
<tr><td colspan="3">Taxonomy for productive establishments (TPE)</td></tr>
<tr><td rowspan="2">1-9 workers
(small establishments)</td><td colspan="2">1-4 workers
(micro establishments)</td></tr>
<tr><td colspan="2">5-9 workers
(small establishments)</td></tr>
<tr><td rowspan="4">10+ workers
(large establishments)</td><td rowspan="3">10-99 workers
(medium establishments)</td><td>10-19 workers
small-medium (SM) establishments</td></tr>
<tr><td>20-49
medium (M) establishments</td></tr>
<tr><td>50-99 workers
medium-large (ML) establishments</td></tr>
<tr><td rowspan="2">100+ workers
(large establishments)</td><td>100-499 workers
large (L) establishments</td></tr>
<tr><td>500+ workers
major (M) establishments</td></tr>
</table>

Source: Author

[5] The distinction between industrial performances and drivers is discussed in Andreoni, 2011; Andreoni, 2013.

2.4 The organization of industry

The adoption of a new taxonomy for productive establishments allows for a more in-depth analysis of the organization of Tanzania's industrial system. The CIP report captures information on the distribution of establishments among the main industries – mining and quarrying, manufacturing, electricity, gas, steam and air conditioning supply and water collection, treatment and supply with their respective activities. Productive establishments are mainly concentrated in the manufacturing sector.

Table 4 presents more disaggregated statistics on the composition of the manufacturing sector by establishment size. First, the group of small establishments (1-9 workers), representing 98.4 per cent of the total of 49,243 establishments according to the industrial census, is primarily composed of micro establishments (1-4 workers). There are 41,656 micro establishments, that is, 88 per cent of the total of small establishments (1-9 workers) and 86 per cent of the total manufacturing establishments in Tanzania. Among micro establishments, 72 per cent are concentrated in two industries, that is, in food products and wearing apparel (85 per cent of all micro establishments, if we include establishments in the furniture industry).

Table 4 also shows that among large establishments (10+ workers), there are 316 medium-large establishments (nearly 32 per cent of all large establishments), while the remaining 682 are small-medium establishments (10-49 workers). There are 38 major establishments in terms of employment (500+ workers) among all manufacturing industries, the majority operating in the food products (15) and textiles (8) industries. Among the large establishments (100-499 workers), together with food and textiles, the industries Tanzania specializes in are beverages (17), rubber and plastic products (17) and chemicals and chemical products (10). The group of medium-large establishments (50-99 workers) is also dominated by the food industry (35 establishment, i.e. 27 per cent), however, a number of establishment clusters operating in other industries can also be found, including fabricated metal products (except machinery and equipment) and furniture. Finally, a number of industries such as tobacco, paper and paper products as well as pharmaceuticals are fairly concentrated (less than 20 firms in total among all group sizes and at least 3 large establishments).

Table 4 Organization of the manufacturing industry (C)

ISIC Rev.4	Industrial Activity	Employment Size							Total
		1 - 4	5 - 9	10 - 19	20-49	50-99	100-499	500+	
10	Manufacture of food products	17,849	1,468	168	119	35	45	15	19,700
11	Manufacture of beverages	14	15	7	13	8	17	2	77
12	Manufacture of tobacco products	3	7	0	0	0	1	3	14
13	Manufacture of textiles	625	51	4	6	4	10	8	708
14	Manufacture of wearing apparel	12,287	994	5	5	1	1	1	13,293
15	Manufacture of leather and related products	124	35	3	5	6	4	0	177
16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	1,309	393	43	16	6	1	2	1,770
17	Manufacture of paper and paper products	3	3	1	4	4	2	1	19
18	Printing and reproduction of recorded media	80	40	12	23	5	8	0	168
19	Manufacture of coke and refined petroleum products	0	0	0	1	1	1	0	3
20	Manufacture of chemicals and chemical products	21	27	14	8	6	10	2	87
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	0	2	1	0	1	3	0	7
22	Manufacture of rubber and plastics products	12	10	9	8	8	17	0	65
23	Manufacture of other non-metallic mineral products	525	489	41	32	9	6	1	1,102
24	Manufacture of basic metals	3	2	2	1	5	5	1	19
25	Manufacture of fabricated metal products, except machinery and equipment	2,919	832	31	9	9	5	0	3,804
26	Manufacture of computer, electronic and optical products	0	1	0	0	0	1	0	2
27	Manufacture of electrical equipment	170	63	1	14	2	3	0	253
28	Manufacture of machinery and equipment n.e.c.	45	40	9	3	2	0	0	99
29	Manufacture of motor vehicles, trailers and semi-trailers	11	13	1	8	2	1	1	38
30	Manufacture of other transport equipment	38	7	0	1	0	1	0	47
31	Manufacture of furniture	5,478	1,285	34	11	9	6	0	6,823
32	Other manufacturing	127	35	1	4	5	3	0	175
33	Repair and installation of machinery and equipment	16	8	2	0	1	1	0	28
	Total	**41,656**	**5,820**	**391**	**290**	**127**	**151**	**38**	**48,474**

If we focus on the other three major industries and their composition in terms of establishments, Table 5 shows that around 13 per cent of them are of a medium-large size (50+ workers), while the remaining establishments employ less than 50 workers. Specifically, nearly 60 per cent of all establishments are small ones (1-9 workers), concentrated in the mining and quarrying and the electricity, gas and air conditioning supply industries. Despite the fact that these are capital intensive industries, the lack of scale in the different value chain stages measured in terms of employment size signals the weakness of the majority of these establishments. The mining and quarrying industry is dominated in particular by small and small-medium establishments accounting for 87 per cent of the entire industry. Across these three industries, we only found 10 major establishments (500+ workers), half of them operating in the mining of metal ores and a number of beneficiation activities. Among the medium establishments group, almost half are active in the other mining and quarrying industry.

Table 5 Organization of the industrial sector (B-D-E)

ISIC Rev.4	Industrial Activity	Employment Size							Total
		1 - 4	5 - 9	10 - 19	20-49	50-99	100-499	500+	
05	Mining of coal and lignite	0	0	0	0	1	0	0	1
07	Mining of metal ores	4	8	11	10	2	4	5	44
08	Other mining and quarrying	73	97	58	80	18	19	2	346
B	**Mining and quarrying**	**77**	**105**	**69**	**90**	**21**	**23**	**7**	**391**
35	Electricity, gas, steam and air conditioning supply	109	15	0	4	4	16	3	151
D	**Electricity, gas, steam and air conditioning supply**	**109**	**15**	**0**	**4**	**4**	**16**	**3**	**151**
36	Water collection, treatment and supply	77	61	33	27	15	9	0	221
38	Waste collection, treatment and disposal activities; materials recovery	1	1	0	1	2	0	0	6
E	**Water supply; sewerage, waste management and remediation activities**	**78**	**62**	**33**	**28**	**18**	**9**	**0**	**227**
	Total	**263**	**182**	**102**	**122**	**43**	**48**	**10**	**769**

Total employment is distributed among these establishments and industries in quite a concentrated and dualistic form (Table 6). Small establishments (1-9 employees) employ a total of around 60,000 people, while the same amount of people are engaged in the 48 major establishments (500+ employees). Medium-large establishments (50-499 employees) employ another 50,000 people. Based on the distinction used in the census between “employees” (defined as “persons who work for pay in a specific period of time”) and “persons engaged” (defined as “persons who work in a specific period of time”), Table 6 also shows the degree to which informal or more precarious employment is concentrated among micro and small establishments. The number of persons engaged is more than double that of employees, especially for the micro establishments, while the number of persons engaged (not employed) is almost zero for medium-large-major establishments.

Table 6 Number of persons engaged and employees by industry and establishment type

a) Number of employees

(Number)

ISIC Rev.4	Industrial Activity	Employment size							
		1-4	5-9	10-19	20-49	50-99	100-499	500+	Total
05	Mining of coal and lignite	0	0	0	0	77	0	0	77
07	Mining of metal ores	6	50	136	286	107	1,093	8,102	9,779
08	Other mining and quarrying	85	490	799	2,398	1,250	2,989	1,291	9,302
B	**Mining and Quarrying**	**91**	**540**	**936**	**2,684**	**1,433**	**4,082**	**9,393**	**19,158**
10	Manufacture of food products	18,565	6,437	1,938	2,991	2,424	9,168	22,340	63,863
11	Manufacture of beverages	24	87	96	362	558	4,384	1,408	6,919
12	Manufacture of tobacco products	6	37	0	0	0	122	4,939	5,103
13	Manufacture of textiles	546	138	43	159	244	3,214	12,305	16,649
14	Manufacture of wearing apparel	6,235	2,500	52	140	86	137	1,302	10,453
15	Manufacture of leather and related products	117	164	43	192	413	480	0	1,410
16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	1,764	1,775	514	375	353	147	2,281	7,209
17	Manufacture of paper and paper products	3	18	12	149	305	248	1,507	2,242
18	Printing and reproduction of recorded media	126	229	157	724	257	1,655	0	3,149
19	Manufacture of coke and refined petroleum products	0	0	0	20	85	136	0	241
20	Manufacture of chemicals and chemical products	30	162	143	179	376	2,284	3,255	6,429
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	0	6	12	0	73	689	0	780
22	Manufacture of rubber and plastics products	10	56	141	282	634	3,162	0	4,286
23	Manufacture of other non-metallic mineral products	1,194	2,503	454	839	555	1,754	793	8,093
24	Manufacture of basic metals	5	11	33	41	310	1,241	523	2,164
25	Manufacture of fabricated metal products, except machinery and equipment	3,937	3,340	358	251	549	949	0	9,382
26	Manufacture of computer, electronic and optical products	0	8	0	0	0	108	0	116
27	Manufacture of electrical equipment	136	279	12	338	106	490	0	1,360
28	Manufacture of machinery and equipment n.e.c.	73	179	115	90	137	0	0	594
29	Manufacture of motor vehicles, trailers and semi-trailers	17	75	11	268	156	120	713	1,359
30	Manufacture of other transport equipment	34	27	0	41	0	156	0	259
31	Manufacture of furniture	5,533	4,569	327	268	689	1,550	0	12,935
32	Other manufacturing	157	196	13	126	379	637	0	1,508
33	Repair and installation of machinery and equipment	24	41	23	0	53	241	0	383
C	**Manufacturing**	**38,534**	**22,837**	**4,499**	**7,835**	**8,742**	**33,074**	**51,366**	**166,889**
35	Electricity, gas, steam and air conditioning supply	136	70	0	114	286	3,902	3,613	8,121
D	**Electricity, Gas, Steam and air Conditioning supply**	**136**	**70**	**0**	**114**	**286**	**3,902**	**3,613**	**8,121**
36	Water collection, treatment and supply	117	320	465	827	1,121	1,669	0	4,519
38	Waste collection, treatment and disposal activities; materials recovery	3	9	0	44	182	0	0	237
E	**Water supply; sewerage, waste management and remediation activities Total**	**120**	**329**	**465**	**871**	**1,303**	**1,669**	**0**	**4,756**
	Total	**38,881**	**23,776**	**5,900**	**11,504**	**11,764**	**42,727**	**64,372**	**198,924**

b) Number of persons engaged

(Number)

ISIC Rev.4	Industrial Activity	Employment Size							
		1-4	5-9	10-19	20-49	50-99	100-499	500+	Total
05	Mining of coal and lignite	0	0	0	0	77	0	0	77
07	Mining of metal ores	14	60	153	307	108	1,099	8,102	9,843
08	Other mining and quarrying	177	739	864	2,507	1,267	3,139	1,295	9,987
B	**Mining and Quarrying**	**191**	**799**	**1,017**	**2,814**	**1,452**	**4,237**	**9,397**	**19,907**
10	Manufacture of food products	35,679	9,620	2,305	3,434	2,445	9,504	22,343	85,330
11	Manufacture of beverages	42	104	100	391	567	4,392	1,408	7,004
12	Manufacture of tobacco products	7	42	0	0	0	122	4,939	5,109
13	Manufacture of textiles	1,304	344	61	218	262	3,216	12,309	17,714
14	Manufacture of wearing apparel	22,836	5,959	68	145	92	137	1,302	30,538
15	Manufacture of leather and related products	272	238	47	192	415	561	0	1,726
16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	3,173	2,476	575	406	360	147	2,281	9,418
17	Manufacture of paper and paper products	5	20	12	150	311	248	1,507	2,253
18	Printing and reproduction of recorded media	209	280	171	733	291	1,655	0	3,339
19	Manufacture of coke and refined petroleum products	0	0	0	20	86	137	0	243
20	Manufacture of chemicals and chemical products	62	203	189	206	441	2,289	3,255	6,645
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	0	12	14	0	73	691	0	790
22	Manufacture of rubber and plastics products	31	68	143	294	639	3,167	0	4,342
23	Manufacture of other non-metallic mineral products	1,644	3,192	530	911	557	1,757	793	9,385
24	Manufacture of basic metals	8	12	33	41	314	1,262	524	2,194
25	Manufacture of fabricated metal products, except machinery and equipment	7,546	5,154	398	279	561	951	0	14,889
26	Manufacture of computer, electronic and optical products	0	9	0	0	0	115	0	124
27	Manufacture of electrical equipment	349	443	13	338	109	490	0	1,741
28	Manufacture of machinery and equipment n.e.c.	121	246	132	90	137	0	0	726
29	Manufacture of motor vehicles, trailers and semi-trailers	29	90	14	269	156	120	713	1,391
30	Manufacture of other transport equipment	80	51	0	41	0	158	0	330
31	Manufacture of furniture	12,611	8,151	439	295	691	1,553	0	23,739
32	Other manufacturing	297	246	13	131	383	639	0	1,709
33	Repair and installation of machinery and equipment	41	59	23	0	53	241	0	418
C	**Manufacturing**	**86,346**	**37,020**	**5,280**	**8,583**	**8,942**	**33,554**	**51,374**	**231,098**
35	Electricity, gas, steam and air conditioning supply	238	97	0	114	286	3,902	3,613	8,250
D	**Electricity, gas, steam and air conditioning supply**	**238**	**97**	**0**	**114**	**286**	**3,902**	**3,613**	**8,250**
36	Water collection, treatment and supply	182	449	470	833	1,122	1,669	0	4,726
38	Waste collection, treatment and disposal activities; materials recovery	3	11	0	44	184	0	0	242
E	**Water supply; sewerage, waste management and remediation activities**	**185**	**461**	**470**	**877**	**1,306**	**1,669**	**0**	**4,968**
	Total	**86,960**	**38,376**	**6,767**	**12,388**	**11,986**	**43,363**	**64,384**	**264,223**

The adoption of a more disaggregate taxonomy for industrial establishments also allows capturing the very high degree of regional concentration of industrial and manufacturing activities by different establishment types. As reported in Table 7, nearly 2/3 of large industrial establishments (those with 10+ employees) are concentrated in five main regions for a total of 796 production units. These regions are: Dar es Salaam (389), Manyara (167), Arusha (89), Kagera (77) and Mbeya (74). While there are only 35 per cent of all industrial establishments in Tanzania, they are home to 40 per cent of the major establishments and around 2/3 of all large, medium-large and medium establishments. There is also another group of regions with a significant number of large establishments. These are: Kilimanjaro (65), Mwanza (56), Morogoro (52) and Tanga (48) as well as Iringa, Mara and Shinyanga. The remaining regions present a relatively limited number of large establishments, namely less than 10 establishments with 50+ employees.

While the number of establishments of different sizes in each region highlights the type of regional industrial organization, that is, whether the region is driven mainly by micro-small, small-medium or medium-large-major establishments, it does not tell us anything about the type of sectoral specialization of that region. By linking these three variables—region, industry and establishment type—we can identify the degree of specialization of each region and its diversification in terms of production, the existence of some agglomeration economies and the main drivers of the industrial system. In fact, some regions might be more reliant on small-medium establishments while others are mainly driven by medium-large-major ones. Table 8 provides this type of analysis for Dar es Salaam, the most industrialized and diversified region with the highest MVA in Tanzania (more on this in section 3 on industrial performance).

Table 7 Establishments by region and employment size, mainland Tanzania

Region	Employment Size							Total
	1 - 4	5 - 9	10 - 19	20-49	50-99	100-499	500+	
Dodoma	1,608	212	**15**	**9**	**2**	**4**	**0**	1,850
Arusha	1,826	231	**30**	**15**	**20**	**19**	**5**	2,146
Kilimanjaro	1,494	197	**29**	**15**	**11**	**8**	**2**	1,757
Tanga	1,502	166	**13**	**11**	**8**	**12**	**4**	1,716
Morogoro	2,627	403	**17**	**17**	**1**	**5**	**7**	3,077
Pwani	1,216	234	8	9	1	5	1	1,474
Dar es Salaam	5,802	1,253	**111**	**118**	**68**	**81**	**11**	7,443
Lindi	675	181	7	3	0	2	0	868
Mtwara	870	123	0	3	5	3	0	1,005
Ruvuma	3,258	201	10	7	1	1	0	3,477
Iringa	2,277	209	9	7	6	7	3	2,518
Mbeya	2,542	248	**33**	**23**	**6**	**12**	**0**	2,864
Singida	1,389	219	33	13	2	1	0	1,657
Tabora	865	84	7	3	1	3	0	963
Rukwa	868	64	3	5	1	0	0	942
Kigoma	841	102	9	1	1	2	0	957
Shinyanga	929	233	22	11	2	1	3	1,201
Kagera	2,062	276	**35**	**31**	**3**	**6**	**2**	2,415
Mwanza	1,075	279	**23**	**13**	**8**	**8**	**4**	1,410
Mara	2,981	540	8	9	4	4	2	3,549
Manyara	2,067	166	**60**	**79**	**14**	**13**	**1**	2,400
Njombe	1,547	120	0	4	2	1	1	1,676
Katavi	200	20	0	1	0	0	0	221
Simiyu	638	112	10	2	0	0	0	762
Geita	762	129	1	1	1	0	1	895
Total	**41,919**	**6,002**	**493**	**412**	**170**	**199**	**48**	**49,243**
%	**85.1**	**12.2**	**1.0**	**0.8**	**0.3**	**0.4**	**0.1**	**100.0**

Table 8 Organization of Dar es Salaam's industrial system

ISIC Rev4	Level2	Description	10 - 19	20-49	50-99	100-499	500+	Total
	05	Mining of coal and lignite	0	0	0	0	0	0
B	07	Mining of metal ores	0	0	0	0	0	0
B	08	Other mining and quarrying	0	1	1	1	0	3
C	10	Manufacture of food products	24	14	8	11	5	63
C	11	Manufacture of beverages	0	4	4	6	1	15
C	12	Manufacture of tobacco products	0	0	0	1	1	2
C	13	Manufacture of textiles	3	3	2	4	1	12
C	14	Manufacture of wearing apparel	1	3	0	1	0	5
C	15	Manufacture of leather and related products	1	4	4	3	0	11
C	16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	10	4	1	1	0	16
C	17	Manufacture of paper and paper products	1	2	3	1	0	7
C	18	Printing and reproduction of recorded media	3	18	3	8	0	32
C	19	Manufacture of coke and refined petroleum products	0	0	1	1	0	2
C	20	Manufacture of chemicals and chemical products	7	4	4	7	1	22
C	21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	1	0	1	3	0	5
C	22	Manufacture of rubber and plastics products	7	5	7	11	0	31
C	23	Manufacture of other non-metallic mineral products	16	15	3	1	1	36
C	24	Manufacture of basic metals	2	1	4	4	0	11
C	25	Manufacture of fabricated metal products, except machinery and equipment	14	7	4	3	0	28
C	26	Manufacture of computer, electronic and optical products	0	0	0	0	0	0
C	27	Manufacture of electrical equipment	0	14	1	3		18
C	28	Manufacture of machinery and equipment n.e.c.	1	1	0		0	2
C	29	Manufacture of motor vehicles, trailers and semi-trailers	1	6	2	1	0	11
C	30	Manufacture of other transport equipment		0	6	1	0	7
C	31	Manufacture of furniture	14	5	5	4	0	29
C	32	Other manufacturing	1	4	1	2	0	8
C	33	Repair and installation of machinery and equipment	1	0	0	1	0	2
D	35	Electricity, gas, steam and air conditioning supply		0	1		1	2
E	36	Water collection, treatment and supply	2	1	0	1	0	4
E	38	Waste collection, treatment and disposal activities; materials recovery	0	1	1	0	0	2
		Total Dar es Salaam	**111**	**118**	**68**	**81**	**11**	**389**
		Total Tanzania	493	412	170	199	48	1,322

Dar es Salaam's industrial system is structured around six major manufacturing industries including food products, chemicals, non-metallic mineral products, rubber and plastic products and furniture. The food and the rubber and plastic products industries are dominated by large and major establishments, although both industries have a fairly diversified set of companies of different sizes. This suggests the existence of agglomeration economies in the Dar es Salaam region around these productive industries.

The possibility of identifying potential industrial clusters in different regions is important for the design of industrial policies supporting diversification. Indeed, regions with existing industrial clusters in certain industries might also be supported in strengthening their competitiveness by developing backward and forward linkages with other industries and attract firms in the regions (see TICR, 2016).

By contrast, for those regions with low levels of diversification and an industrial system that is mainly constituted of small establishments, the opportunities for diversification and backward and forward linkage development are limited, and an analysis might suggest the need to strengthen existing industries by scaling up existing establishments (supporting economies of scale) before implementing diversification incentives (promotion of economies of scope).

3. Industrial performance

The industrial performance of an industrial system can be captured by many indicators. In the TICR 2016, for example, the industrial competitiveness of Tanzania is benchmarked against international comparators by constructing composite indexes based on industrial output and the value added of manufacturing industries, as well as their export performance, composition and penetration in the regional and global markets. The CIP database provides the opportunity to analyse Tanzania's industrial performance from a *micro perspective*, that is, starting from firm-level value added performance by considering establishments of different sizes and their distribution in different regions and across different industries (3.1); workers' per capita productivity as well as the productivity of establishments of different sizes in different industries (3.2); manufacturing sales in both the domestic and export markets for establishments of different sizes operating in different industries (3.3).

From a policy perspective, this information and its triangulation opens the door to more targeted industrial policy interventions, for example, by supporting firms in reaching higher levels of productivity by increasing their scale or by accessing regional markets. It is also useful to support regional industrial policies by focusing on regions where there is potential for linking up smaller establishments to bigger players with a stronger technological base and better access to domestic and export markets.

3.1 Manufacturing value added by regions, industries and establishment types

Manufacturing value added (MVA) is a key indicator of industrial performance. According to the CIP census, the MVA is calculated as the difference between the value of gross output and value of intermediate consumption (i.e. the contribution of manufacturing establishments to the value of finished and semi-finished manufactured goods and services).

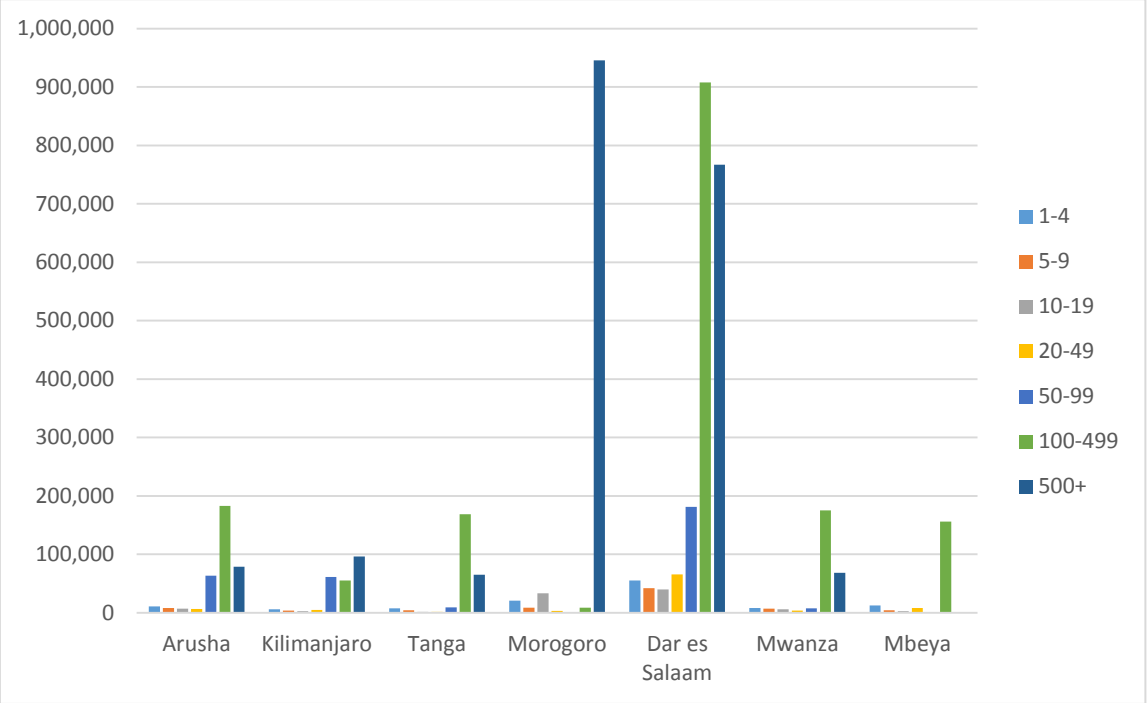
From a regional perspective, the CIP report highlights that the Dar es Salaam region produced the highest MVA with TZS 2,059,503 million (42.0 per cent of total MVA); followed by Morogoro with TZS 1,020,646 million (20.8 per cent); and Arusha with TZS 356,691 million (7.3 per cent). Katavi region had the lowest MVA amounting to TZS 2,305 million (0.05 per cent of total MVA). Table 9 complements these results by providing more disaggregated information on manufacturing value added by region and by different types of establishments according to the new taxonomy proposed above (see section 2). MVA is concentrated in seven leading regions—Dar es Salaam, Morogoro, Arusha, Mwanza, Tanga, Kilimanjaro and Mbeya—accounting for 89.3 per cent of total MVA in Tanzania. It is striking that the small establishments (1-9 employees), while in total employing the same amount of people as the 48 major establishments (500+), generate only 1/10 of the MVA produced by the major establishments. By contrast, medium-large establishments contribute 50 per cent of total MVA in Tanzania and hire around 70,000 people (see Table 6 above).

Dar es Salaam and Morogoro are the two main regions contributing to manufacturing value added, however, their industrial organization differs significantly. While 93 per cent of value added in Morogoro is produced by major establishments (500+), manufacturing value added in Dar es Salaam is generated by a much more diversified set of establishments. Large establishments (100-499 workers) are the biggest contributor to MVA with 44 per cent of value added, followed by major establishments (500+ workers) accounting for 37 per cent of MVA in the region. Medium-large establishments account for 9 per cent. Other regions where manufacturing value added is generated primarily by large establishments (100-499 workers) are Mwanza, Mbeya, Arusha and Tanga.

Table 9 Manufacturing value added by establishment size and region – 2013

				Establishment types				(Million Tshs)	
Region	1-4	5-9	10-19	20-49	50-99	100-499	500+	**Total**	**% Total MVA**
Dodoma	8,918	6,931	914	3,663	2,395	5,846	0	28,667	0.6%
Arusha	11,012	7,853	6,784	6,534	63,188	182,673	78,647	356,691	7.3%
Kilimanjaro	5,900	3,909	2,585	4,901	61,199	55,218	96,172	229,884	4.7%
Tanga	7,541	4,126	1,655	1,663	9,285	168,441	65,349	258,061	5.3%
Morogoro	20,469	8,468	33,486	3,166	592	8,673	945,793	1,020,646	20.8%
Pwani	5,424	4,592	594	329	2,223	6,182	4,284	23,630	0.5%
Dar es Salaam	55,309	42,113	40,100	65,820	181,442	907,667	767,053	2,059,503	42.0%
Lindi	2,839	1,469	1,130	0	0	0	0	5,437	0.1%
Mtwara	1,574	683	0	507	484	27,216	0	30,465	0.6%
Ruvuma	9,278	4,489	1,044	2,218	0	0	0	17,030	0.3%
Iringa	6,121	3,676	1,357	2,747	2,514	39,174	42,448	98,038	2.0%
Mbeya	12,627	4,069	2,886	8,283	699	156,064	0	184,628	3.8%
Singida	9,351	5,084	8,093	4,581	463	0	0	27,573	0.6%
Tabora	4,408	1,074	867	921	0	186	0	7,457	0.2%
Rukwa	3,123	841	48	52,817	0	0	0	56,829	1.2%
Kigoma	1,541	1,124	19,487	35	0	0	0	22,187	0.5%
Shinyanga	8,166	10,124	5,503	8,812	0	0	0	32,605	0.7%
Kagera	5,413	2,858	17,258	3,521	1,121	3,790	51,051	85,013	1.7%
Mwanza	7,880	6,848	5,783	3,710	7,703	175,329	68,238	275,489	5.6%
Mara	16,445	4,644	522	887	971	12,935	0	36,404	0.7%
Manyara	7,911	3,539	1,731	1,343	0	0	0	14,523	0.3%
Njombe	2,695	1,094	0	5,858	2,579	8,944	3,326	24,496	0.5%
Katavi	1,633	672	0	0	0	0	0	2,305	0.0%
Simiyu	3,058	2,221	971	43	0	0	0	6,293	0.1%
Geita	1,767	2,372	0	0	0	0	0	4,139	0.1%
Total	220,403	134,872	152,800	182,357	336,860	1,758,339	2,122,361	4,907,992	100.0%
% Total MVA	4.5%	2.7%	3.1%	3.7%	6.9%	35.8%	43.2%	100.0%	

Figure 3Manufacturing value added by region and establishment type



The contribution of establishments to value added varies significantly across industries and according to different establishment types in accordance with the new taxonomy proposed above (see section 2). Table 10 shows how across all industries and among large establishments (10+), the contribution to total industrial value added is particularly concentrated among the major establishments (500+ workers) and large establishments (100-499 workers), contributing 60 per cent and 25 per cent, respectively. The remaining 15 per cent of value added is generated by medium-large establishments (6 per cent), small-medium establishments (5 per cent) and the remaining 4 per cent by small establishments (1-9 workers). In the mining and quarrying industry (mainly metal ores), the degree of concentration of value added among major establishments (500+ workers) reaches 90 per cent of the total value added estimated at TZS 2,920,392 million.

By contrast, the manufacturing industry registers a much higher distribution in terms of value added across both industries and establishments of different sizes, with a significant share of large establishments contributing to value added. In the manufacturing industry, medium-large and large establishments together account for the same value added generated by major establishments (around TZS 2,100,000).

Moreover, if we look at the top five manufacturing industries for value added (see Figure 4 below), the contribution to value added in the manufacturing of beverages, other non-metallic mineral products and rubber and plastic products is significantly higher among large establishments than major ones.

Figure 4Manufacturing value added for major industrial sectors and establishment types

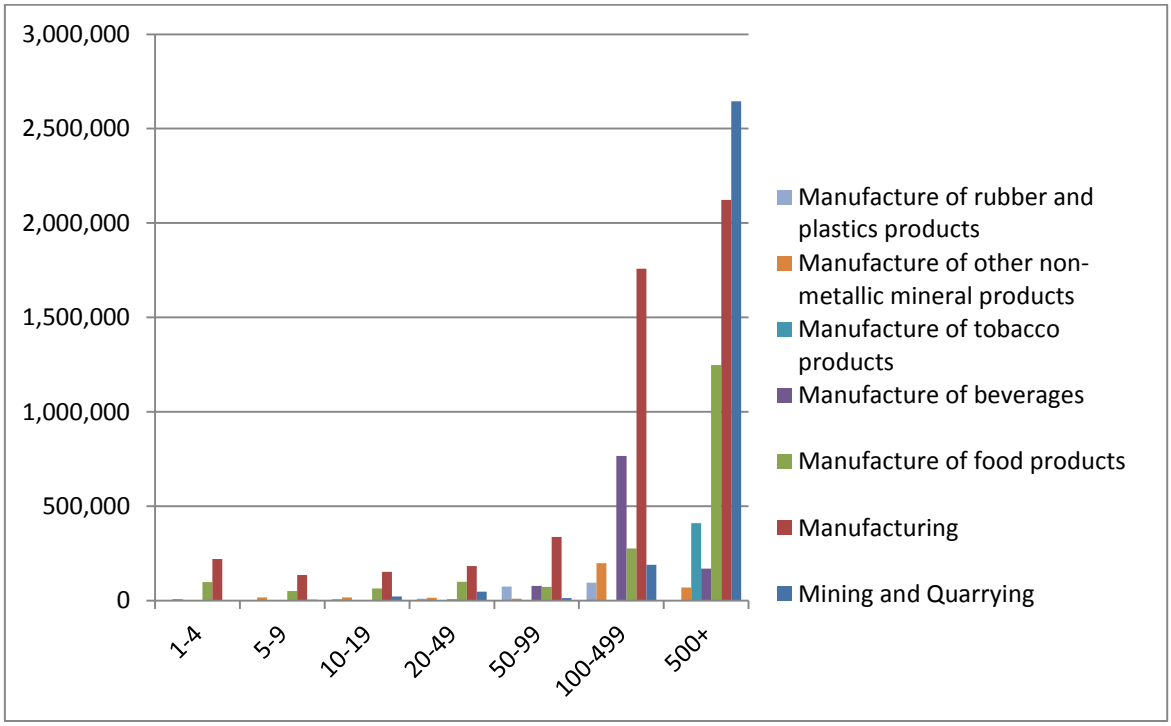


Table 10 Value added by industry and establishment type

(000 thsd)

ISIC Rev.4	Industrial Activity	Employment size							Total
		1-4	5-9	10-19	20-49	50-99	100-499	500+	
05	Mining of coal and lignite	0	0	0	0	392,949	0	0	392,949
07	Mining of metal ores	76,648	929,219	8,049,048	3,166,165	1,966,012	171,467,505	2,611,625,934	2,797,280,530
08	Other mining and quarrying	698,812	3,171,636	13,652,750	43,028,729	10,782,995	18,602,916	32,780,823	122,718,661
B	**Mining and Quarrying**	**775,460**	**4,100,854**	**21,701,798**	**46,194,894**	**13,141,955**	**190,070,421**	**2,644,406,757**	**2,920,392,140**
10	Manufacture of food products	98,509,767	49,787,209	63,488,755	99,145,448	72,905,619	276,635,006	1,248,045,740	1,908,517,544
11	Manufacture of beverages	151,159	899,530	932,876	5,943,589	77,493,491	765,894,932	168,994,820	1,020,310,397
12	Manufacture of tobacco products	17,776	53,402	0	0	0	539,695	409,327,392	409,938,265
13	Manufacture of textiles	3,264,395	484,483	965,647	15,567,001	6,543,306	36,902,928	103,753,978	167,481,738
14	Manufacture of wearing apparel	44,845,349	9,343,272	576,682	1,568,817	367,648	654,773	6,881,590	64,238,133
15	Manufacture of leather and related products	899,701	539,361	523,060	2,331,732	5,165,949	5,944,730	0	15,404,533
16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	9,262,847	9,602,216	36,216,148	2,935,881	4,397,570	1,485,722	22,872,040	86,772,424
17	Manufacture of paper and paper products	32,113	68,928	82,773	1,065,706	3,090,735	5,104,254	6,975,608	16,420,118
18	Printing and reproduction of recorded media	1,146,462	2,343,599	1,997,467	10,107,417	6,990,215	50,379,824	0	72,964,983
19	Manufacture of coke and refined petroleum products	0	0	0	149,645	526,859	14,383,260	0	15,059,764
20	Manufacture of chemicals and chemical products	197,351	761,516	9,891,731	1,425,304	9,505,243	76,608,565	74,427,866	172,817,576
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	0	13,116	730,223	0	1,340,426	17,509,612	0	19,593,376
22	Manufacture of rubber and plastics products	49,872	540,914	8,673,714	9,040,247	73,973,661	94,355,511	0	186,633,919

23	Manufacture of other non-metallic mineral products	8,693,326	16,439,922	15,700,440	13,882,204	10,240,669	198,240,352	68,921,708	332,118,619
24	Manufacture of basic metals	7,053	53,475	4,804,629	423,587	6,222,094	13,263,061	7,876,063	32,649,961
25	Manufacture of fabricated metal products, except machinery and equipment	20,277,298	16,082,380	4,164,673	2,587,266	14,993,400	14,458,162	0	72,563,178
26	Manufacture of computer, electronic and optical products	0	28,998	0	0	0	30,967,457	0	30,996,455
27	Manufacture of electrical equipment	922,654	1,647,890	84,274	4,696,116	10,244,897	7,290,155	0	24,885,987
28	Manufacture of machinery and equipment n.e.c.	500,799	1,672,577	1,054,198	742,695	2,450,966	0	0	6,421,235
29	Manufacture of motor vehicles, trailers and semi-trailers	119,783	569,772	21,166	7,114,940	1,952,482	2,849,451	4,284,110	16,911,704
30	Manufacture of other transport equipment	172,994	92,136	0	87,826	0	13,795,559	0	14,148,515
31	Manufacture of furniture	30,145,045	22,422,477	2,351,973	1,956,933	9,902,233	93,204,942	0	159,983,602
32	Other manufacturing	1,084,681	1,106,587	380,038	1,584,343	18,187,394	6,531,148	0	28,874,190
33	Repair and installation of machinery and equipment	102,631	318,616	159,193	0	364,890	31,340,099	0	32,285,430
C	**Manufacturing**	**220,403,056**	**134,872,376**	**152,799,659**	**182,356,697**	**336,859,746**	**1,758,339,198**	**2,122,360,915**	**4,907,991,647**
35	Electricity, gas, steam and air conditioning supply	626,244	193,995	0	3,057,782	103,744,074	100,942,545	103,165,579	311,730,218
D	**Electricity, Gas, Steam and air Conditioning supply**	**626,244**	**193,995**	**0**	**3,057,782**	**103,744,074**	**100,942,545**	**103,165,579**	**311,730,218**
36	Water collection, treatment and supply	652,643	1,150,395	4,775,398	6,195,929	36,536,473	28,335,997	0	77,646,835
38	Waste collection, treatment and disposal activities; materials recovery	75,485	30,207	0	1,944,472	749,231	0	0	2,799,396
E	**Water supply; sewerage, waste management and remediation activities**	**728,128**	**1,180,602**	**4,775,398**	**8,140,401**	**37,285,704**	**28,335,997**	**0**	**80,446,231**
	Total	**222,532,888**	**140,347,828**	**179,276,856**	**239,749,774**	**491,031,479**	**2,077,688,160**	**4,869,933,251**	**8,220,560,235**

The combined two major manufacturing industries—food products and beverages—generate roughly the same amount of value (TZS 2,928,828 million) produced in the mining and quarrying industry (TZS 2,920,392 million), however, food and beverages establishments employ more than three times the number of people engaged in mining activities (see Table 5 above). The tobacco industry is the third largest manufacturing industry in terms of value added. It employs around 5,000 people, who work almost exclusively in major establishments (500+), that generate MVA. The three next largest manufacturing industries in terms of value added are rubber and plastics, textiles and furniture. While 2/3 of the value added in textiles is generated by major establishments (500+), the other two industries are dominated by medium-large establishments.

3.2 Productivity per employee, persons engaged and establishment types

The assessment of productivity presents a number of technical problems and conceptual issues related to how we measure and understand increases in output per time, given a certain combination of different factor inputs[6]. A simple and direct way to analyse industrial productivity is to measure the "value added per employee" (or number of people engaged) and the "value added per establishment". The first measure is a proxy of the individual worker's contribution to the total value added in the industry and country; while the second measure provides a figure for the productivity of productive organizations of different types, where the size (in terms of number of employees) is the main distinctive factor.

As highlighted in Table 11a, among the most important manufacturing industries, productivity is particularly high in the beverages industry, where productivity per capita is more than four times higher than that reached by employees in the food industry. The tobacco industry also has high levels of productivity, but only roughly half of the productivity of the beverages industry.

[6] See (Diao et al., 2016) for an analysis of productivity in the informal sector in Tanzania. See (McMillan et al., 2014) for a broader analysis of structural change and productivity growth in Africa.

Table 11 Productivity per employee and person engaged

a) Productivity per employee (000 thsd)

Level2	ISICREV4_L2.Description	1-4	5-9	10-19	20-49	50-99	100-499	500+	Average
05	Mining of coal and lignite	0	0	0	0	5100	0	0	5100
07	Mining of metal ores	12770	18572	59092	11090	18454	156906	322346	286049
08	Other mining and quarrying	8214	6470	17080	17940	8628	6224	25398	13192
10	Manufacture of food products	5306	7734	32753	33150	30076	30173	55865	29884
11	Manufacture of beverages	6348	10293	9739	16433	138901	174688	119990	147458
12	Manufacture of tobacco products	2962	1462	0	0	0	4421	82882	80329
13	Manufacture of textiles	5974	3519	22462	97846	26849	11481	8432	10059
14	Manufacture of wearing apparel	7193	3737	10998	11166	4279	4763	5286	6145
15	Manufacture of leather and related products	7706	3287	12158	12118	12499	12386	0	10928
16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	5252	5411	70406	7831	12447	10118	10026	12036
17	Manufacture of paper and paper products	10700	3757	6894	7149	10140	20571	4629	7323
18	Printing and reproduction of recorded media	9121	10240	12685	13951	27158	30434	0	23169
19	Manufacture of coke and refined petroleum products	0	0	0	7478	6195	105702	0	62455
20	Manufacture of chemicals and chemical products	6687	4696	68968	7956	25268	33546	22867	26881
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	0	2185	60819	0	18352	25399	0	25106
22	Manufacture of rubber and plastics products	4896	9629	61386	32069	116732	29836	0	43548
23	Manufacture of other non-metallic mineral products	7280	6567	34569	16548	18454	113030	86866	41039
24	Manufacture of basic metals	1410	4858	145517	10326	20060	10690	15051	15087
25	Manufacture of fabricated metal products, except machinery and equipment	5151	4815	11646	10328	27308	15237	0	7734
26	Manufacture of computer, electronic and optical	0	3622	0	0	0	286582	0	267065
27	Manufacture of electrical equipment	6791	5904	7019	13911	96598	14886	0	18294
28	Manufacture of machinery and equipment n.e.c.	6848	9364	9129	8294	17883	0	0	10813
29	Manufacture of motor vehicles, trailers and semi-trailers	7184	7637	1894	26560	12497	23719	6012	12441
30	Manufacture of other transport equipment	5015	3410	0	2141	0	88386	0	54708
31	Manufacture of furniture	5448	4908	7198	7302	14378	60116	0	12368
32	Other manufacturing	6902	5642	29218	12542	48038	10252	0	19144
33	Repair and installation of machinery and equipment	4252	7726	6918	0	6881	129972	0	84396
35	Electricity, gas, steam and air conditioning supply	4619	2770	0	26808	362547	25867	28554	38385
36	Water collection, treatment and supply	5587	3597	10270	7490	32592	16980	0	17184
38	Waste collection, treatment and disposal activities; materials recovery	25153	3450	0	44204	4126	0	0	11796

b) Productivity per person engaged (000 thsd)

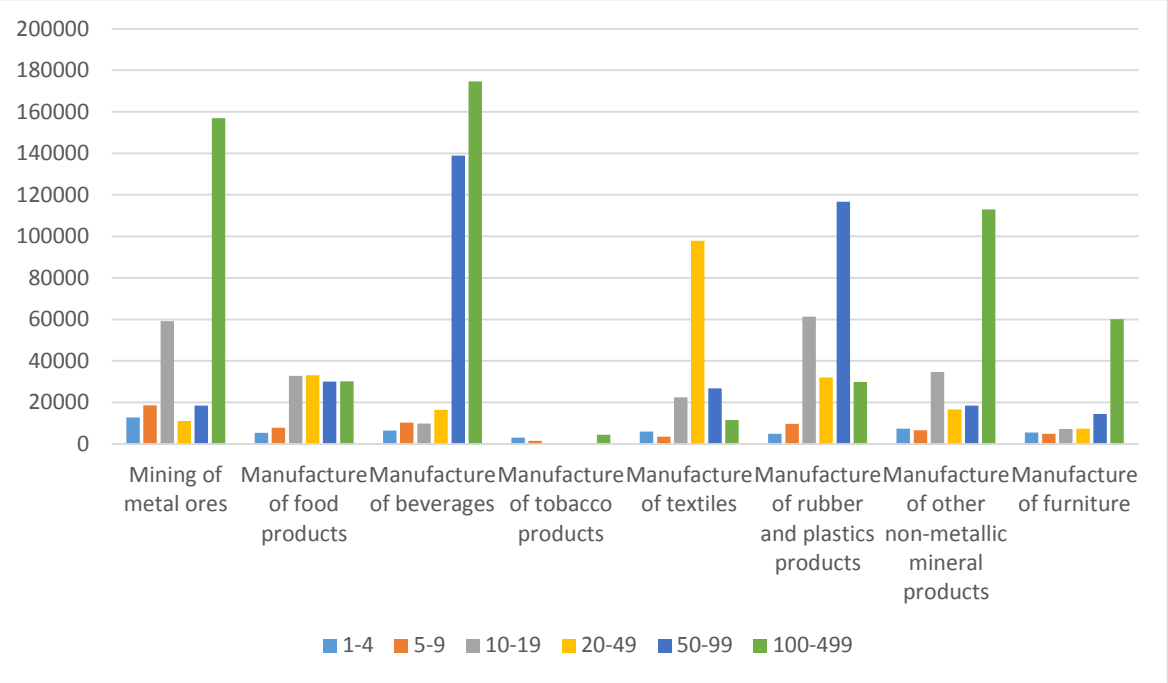
Level2	ISICREV4_L2.Description	1-4	5-9	10-19	20-49	50-99	100-499	500+	Average
05	Mining of coal and lignite	0	0	0	0	5100	0	0	5100
07	Mining of metal ores	5473	15477	52497	10312	18283	156049	322346	284199
08	Other mining and quarrying	3951	4294	15801	17164	8510	5927	25312	12288
10	Manufacture of food products	2761	5175	27541	28872	29824	29106	55860	22366
11	Manufacture of beverages	3639	8671	9344	15207	136657	174366	119990	145678
12	Manufacture of tobacco products	2539	1283	0	0	0	4421	82882	80233
13	Manufacture of textiles	2503	1409	15783	71405	24953	11474	8429	9455
14	Manufacture of wearing apparel	1964	1568	8532	10854	3997	4763	5286	2104
15	Manufacture of leather and related products	3307	2265	11123	12118	12460	10591	0	8927
16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	2919	3879	62974	7232	12213	10118	10026	9213
17	Manufacture of paper and paper products	6420	3444	6894	7101	9947	20571	4629	7289
18	Printing and reproduction of recorded media	5474	8357	11710	13797	24046	30434	0	21852
19	Manufacture of coke and refined petroleum products	0	0	0	7478	6123	104931	0	61941
20	Manufacture of chemicals and chemical products	3195	3743	52327	6913	21543	33468	22867	26006
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	0	1092	52131	0	18352	25326	0	24788
22	Manufacture of rubber and plastics products	1599	7994	60492	30704	115779	29797	0	42981
23	Manufacture of other non-metallic mineral products	5288	5150	29612	15246	18377	112827	86866	35389
24	Manufacture of basic metals	881	4453	145517	10326	19805	10512	15023	14880
25	Manufacture of fabricated metal products, except machinery and equipment	2687	3120	10471	9262	26744	15199	0	4874
26	Manufacture of computer, electronic and optical	0	3220	0	0	0	269138	0	249835
27	Manufacture of electrical equipment	2645	3724	6479	13911	93939	14886	0	14297
28	Manufacture of machinery and equipment n.e.c.	4131	6795	8005	8294	17883	0	0	8848
29	Manufacture of motor vehicles, trailers and semi-trailers	4177	6319	1515	26458	12497	23719	6012	12161
30	Manufacture of other transport equipment	2164	1805	0	2141	0	87267	0	42864
31	Manufacture of furniture	2390	2751	5359	6640	14333	60033	0	6739
32	Other manufacturing	3649	4495	29218	12064	47528	10220	0	16891
33	Repair and installation of machinery and equipment	2492	5361	6918	0	6881	129972	0	77279
35	Electricity, gas, steam and air conditioning supply	2634	1999	0	26808	362547	25867	28554	37784
36	Water collection, treatment and supply	3584	2560	10150	7440	32560	16980	0	16431
38	Waste collection, treatment and disposal activities; materials recovery	25153	2683	0	44204	4072	0	0	11555

Among the other sectors reporting relatively high levels of productivity, we find a number of industries requiring more advanced technological and engineering capabilities, such as repair and installation of machinery and equipment; computer, electronic and optical products; and coke and petroleum products. Finally, given the specific features of the mining of metal ore industry, the level of productivity is extremely high, higher than for any other manufacturing industry.

If we move from an assessment of productivity as the average value added per employee in each industry, and we look at the productivity of employees working in establishments of different size, we find that productivity changes dramatically. Figure 5 provides evidence of this difference in productivity among employees for a selection of key industries. In the mining of metal ores, the productivity of employees reaches its highest level in major establishments (500+), while it is only half that amount in large establishments. In the food products industry, major establishments report a level of productivity that is double that of large establishments; however, small-medium, medium, medium-large and large establishments reach comparable levels. This is the

only industry among those selected in which employers' productivity seems to be unaffected by establishment size. By contrast, the beverages industry reports its highest productivity performance in large establishments (100-499 employees) as well as in medium-large establishments (50-99 employees), both higher than the productivity in major establishments. These results are similar to those reported in the manufacturing of other non-metallic mineral products. Finally, in the textile industry, the highest levels of productivity by far are reached by medium establishments (20-49 employees).

Figure 5Employee productivity in selected industries and by different establishment types



Given the important role that establishment size plays in productivity performance and the fact that the same level of worker productivity can be higher if employed in different productive organizations, Table 12 provides evidence of the productivity levels achieved by different establishment types. Establishments operating in the mining of metal ore have by far the highest levels of productivity. This figure is biased by the very high extractive rents characterizing this industry. Among the manufacturing industries, the major establishments (500+ employees) in the tobacco industry are the most productive. In the food, beverages and other non-metallic mineral products industries, major establishments reach high and comparable levels of productivity. However, while large establishments (100-499 employees) in the beverages and other non-metallic

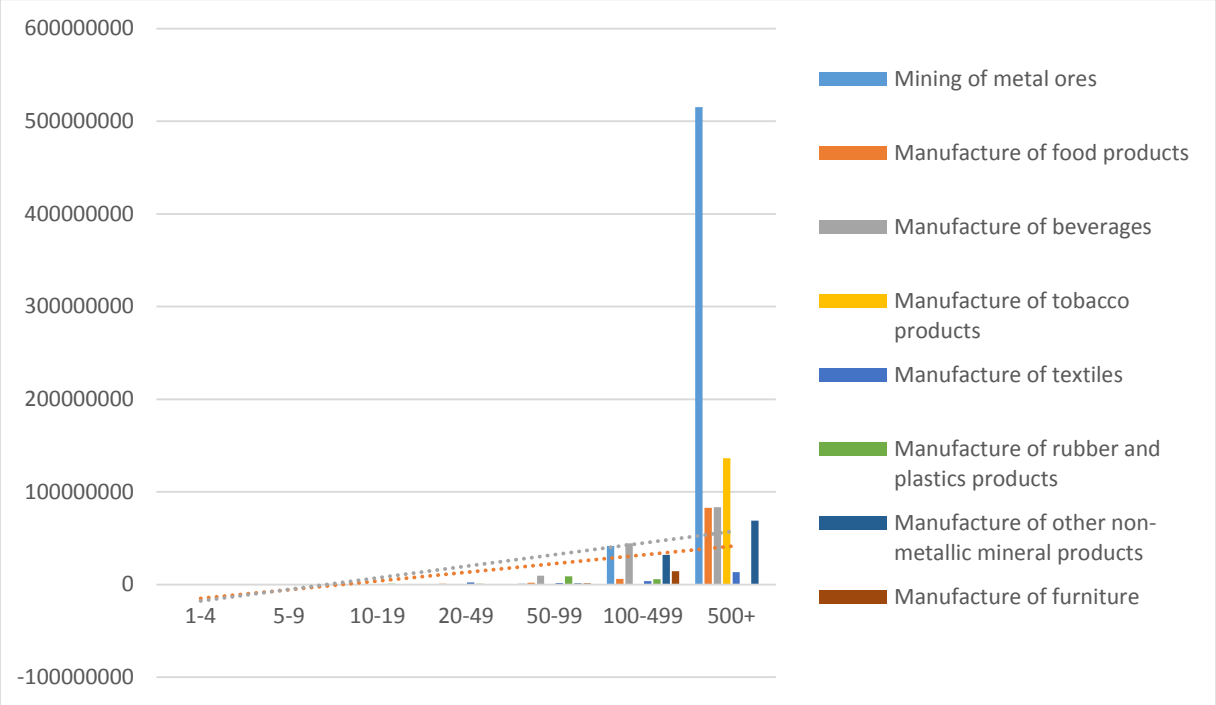
mineral products industries maintain relatively good levels of productivity, they become significantly less productive in the food industry.

Despite all these sectoral differences and their specificities, the evidence suggests that productivity of the establishments is strongly related to their increasing size and the possibility of exploiting economies of scale in production and large-scale organizational advantages. Figure 6 illustrates these trends for a number of selected industries, and highlights the trend linking productivity increases with larger-sized establishments.

Table 12 Productivity per establishment type (000 thsd)

Level2	ISICREV4_L2.Description	1-4	5-9	10-19	20-49	50-99	100-499	500+	Average
05	Mining of coal and lignite	0	0	0	0	392738	0	0	392738
07	Mining of metal ores	19155	116076	725899	310937	968978	41616754	515235015	62866392
08	Other mining and quarrying	9600	32769	236859	540559	600445	995225	15022911	355030
10	Manufacture of food products	5519	33905	377269	834495	2063655	6214070	82705362	96880
11	Manufacture of beverages	11187	58627	130669	451469	9546863	44496957	83509969	13335186
12	Manufacture of tobacco products	5923	7311	0	0	0	539405	136369209	28650940
13	Manufacture of textiles	5225	9523	230738	2516441	1820960	3622101	13334485	236702
14	Manufacture of wearing apparel	3650	9402	114341	310426	363738	647809	6808396	4832
15	Manufacture of leather and related products	7239	15400	174260	479053	880371	1661266	0	87217
16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	7077	24448	838566	187611	765318	1345713	10251349	49037
17	Manufacture of paper and paper products	10700	20665	82729	266284	738915	2550757	6971863	886438
18	Printing and reproduction of recorded media	14404	58950	164911	437130	1385073	6239053	0	435086
19	Manufacture of coke and refined petroleum products	0	0	0	149565	526576	14375538	0	5017226
20	Manufacture of chemicals and chemical products	9284	28030	712728	188003	1703384	7985707	37193953	1985038
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	0	6554	729831	0	1339706	5833404	0	2797457
22	Manufacture of rubber and plastics products	4251	52960	927363	1082333	8949697	5648300	0	2888114
23	Manufacture of other non-metallic mineral products	16559	33616	385176	439096	1177254	32146408	68884704	301301
24	Manufacture of basic metals	2350	26720	2401025	423360	1372971	2651188	7871834	1761143
25	Manufacture of fabricated metal products, except machinery and equipment	6947	19336	133101	284685	1759149	3114859	0	19075
26	Manufacture of computer, electronic and optical	0	28979	0	0	0	30950831	0	15488992
27	Manufacture of electrical equipment	5436	26134	84229	330535	5119699	2289962	0	98299
28	Manufacture of machinery and equipment n.e.c.	11199	42316	111285	226655	1412761	0	0	65040
29	Manufacture of motor vehicles, trailers and semi-trailers	11226	44369	15148	919748	802534	2751381	3066098	450846
30	Manufacture of other transport equipment	4587	13154	0	87779	0	13788152	0	302857
31	Manufacture of furniture	5503	17452	68834	183271	1159210	14548107	0	23449
32	Other manufacturing	8565	31596	379834	391620	3583633	2155076	0	165167
33	Repair and installation of machinery and equipment	6571	37527	79554	0	364694	31323273	0	1148493
35	Electricity, gas, steam and air conditioning supply	5749	12925	0	764035	25922094	6336513	34370063	2066213
36	Water collection, treatment and supply	8506	18942	144127	233750	2362951	3207043	0	350718
38	Waste collection, treatment and disposal activities; materials recovery	75458	24150	0	1591358	337122	0	0	491509

Figure 6Productivity of establishments of different sizes across selected industries



3.3 Manufacturing sales: exports and local sales

Different types of establishments have different capabilities in terms of penetrating and serving domestic and export markets. These differences are determined by sectoral-specific features such as type of product, quality standards that have to be met to export in certain markets, etc.

Table 13 shows that the contribution of all industries to export is highly concentrated among the major establishments (500+ workers), which account for 75 per cent of total exports (equal to TZS 4,133,697 million). These are 48 industrial establishments, mainly operating in the manufacturing subsectors (38 establishments). The 20 per cent of total exports is then produced by large establishments (100-499 workers), while the remaining 5 per cent is produced almost exclusively by establishments with at least 50 workers. No micro, small or small-medium establishment (less than 50 workers) contributes to Tanzania's export sales in a significant way. This implies that reaching a certain operational scale is a pre-condition for meeting the regional and international markets' standards of quality and price competitiveness.

Within manufacturing, 87 per cent of the export value is generated by large and major establishments (each group of establishments contributing roughly half of the total).

Medium-large establishments contribute another 8 per cent, while the remaining 5 per cent is contributed by small-medium establishments. For the three top manufacturing industries in terms of export sales—food, tobacco and textiles—Table 13 also shows that only in the food industry are small-medium establishments able to reach regional and global markets, with a value contribution in exports of 20 per cent of total food exports. In the case of tobacco products and textiles, 99 per cent and 90 per cent of exports, respectively, are produced only by major establishments (500+ employees).

Despite the important role of manufacturing industries (Figure 7), the export basket is dominated by mineral ore exports, 90 per cent of which is extracted and exported by major establishments (500+ employees). The five top manufacturing export industries are: 1) food products, 2) rubber and plastics, 3) tobacco products, 4) other non-metallic mineral products and 5) textiles. In the food industry, medium-large, large and major establishments play a major role. Specifically, medium-large establishments operating in the food industry are largely those able to export abroad compared with establishments of similar size in other industries. Major establishments in the tobacco and textile industry also contribute a significant share, while mainly large establishments in rubber and plastic products export abroad. Interestingly, the beverages industry exports a very limited amount of products, and focuses almost completely on the domestic market.

Figure 7Export basket composition by establishment type

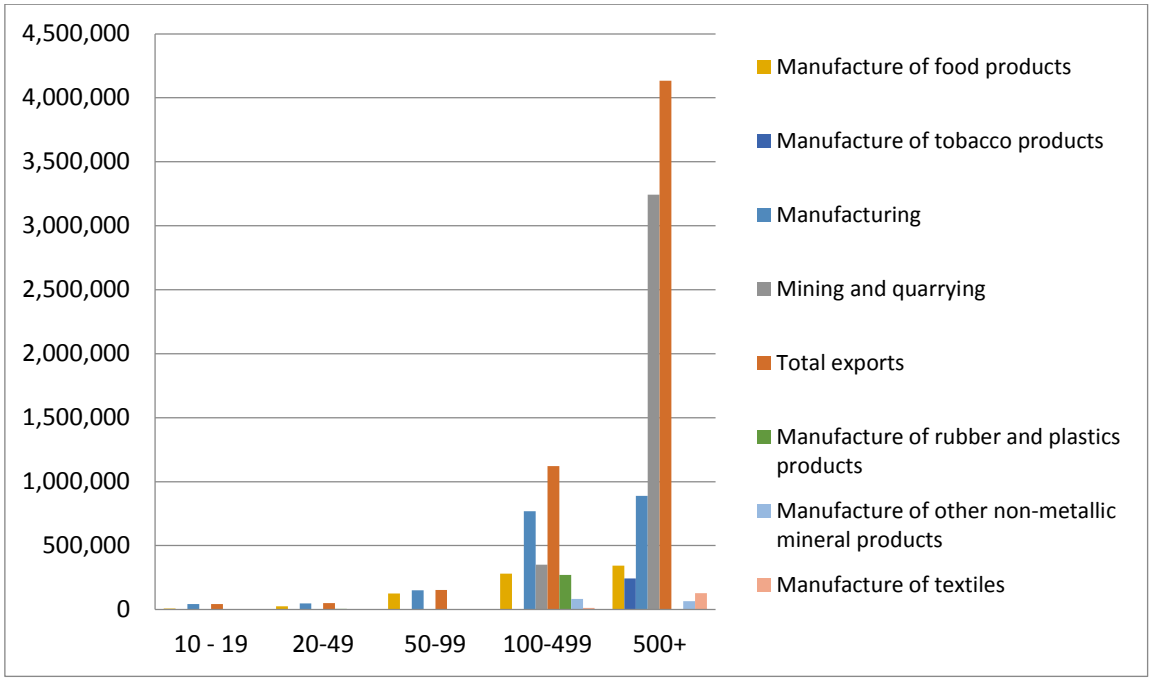
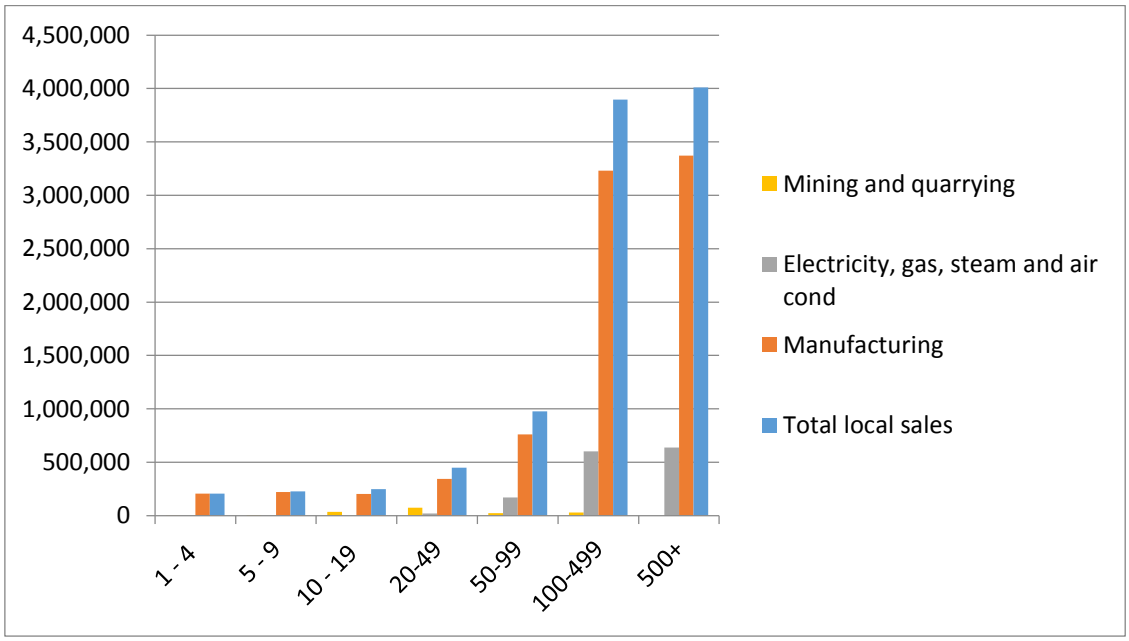


Table 13 Export sales by industry and establishment type

							(Million TZS)	
ISIC Rev 4	Industrial sub-sector	**10 - 19**	**20-49**	**50-99**	**100-499**	**500+**	**Total**	**% tot export**
05	Mining of coal and lignite	0	0	0	0	0	0	0
07	Mining of metal ores	0	0	0	342,644	3,156,281	3,498,926	64%
08	Other mining and quarrying	0	0	0	8,999	87,808	96,807	1.76%
B	**Mining and quarrying**	0	0	0	351,643	3,244,090	3,595,733	65.35%
10	Manufacture of food products	7,777	26,686	126,747	281,729	344,390	787,328	14.31%
11	Manufacture of beverages	0	0	0	9,576	783	10,359	0.19%
12	Manufacture of tobacco products	0	0	0	1,539	242,991	244,530	4.44%
13	Manufacture of textiles	0	0	0	13,102	128,692	141,794	2.58%
14	Manufacture of wearing apparel	0	0	78	0	14,788	14,865	0.27%
15	Manufacture of leather and related products	1,083	7,485	1,286	0	0	9,854	0.18%
16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	34,611	4,574	30	3,822	9,367	52,404	0.95%
17	Manufacture of paper and paper products	0	0	0	0	34,575	34,575	0.63%
18	Printing and reproduction of recorded media	0	113	1,827	1,527	0	3,467	0.06%
19	Manufacture of coke and refined petroleum products	0	0	6,411	7,460	0	13,871	0.25%
20	Manufacture of chemicals and chemical products	311	2,517	4,532	34,107	47,309	88,776	1.61%
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	0	0	0	3,203	0	3,203	0.06%
22	Manufacture of rubber and plastics products	0	4,361	118	271,083	0	275,561	5.01%
23	Manufacture of other non-metallic mineral products	121	0	0	82,943	66,711	149,774	2.72%
24	Manufacture of basic metals	35	0	3,594	6,038	0	9,667	0.18%
25	Manufacture of fabricated metal products, except machinery and equipment	0	0	807	0	0	807	0.01%
26	Manufacture of computer, electronic and optical products	0	0	0	16,318	0	16,318	0.30%
27	Manufacture of electrical equipment	0	0	5,549	0	0	5,549	0.10%
28	Manufacture of machinery and equipment n.e.c.	0	0	0	0	0	0	0.00%
29	Manufacture of motor vehicles, trailers and semi-trailers	0	1,580	216	8,108	0	9,905	0.18%
30	Manufacture of other transport equipment	0	0	0	0	0	0	0.00%
31	Manufacture of furniture	0	0	0	27,087	0	27,087	0.49%
32	Other manufacturing	0	20	615	2,146	0	2,781	0.05%
33	Repair and installation of machinery and equipment	0	0	0	0	0	0	0.00%
C	**Manufacturing**	43,936	47,336	151,810	769,788	889,607	1,902,476	34.57%
35	Electricity, gas, steam and air conditioning supply	0	0	0	0	0	0	0.00%
D	**Electricity, gas, steam and air conditioning supply**	0	0	0	0	0	0	0.00%
36	Water collection, treatment and supply	0	0	0	0	0	0	0.00%
38	Waste collection, treatment and disposal activities; materials recovery	0	3,168	1,129	0	0	4,297	0.08%
E	**Water supply; sewerage, waste management and remediation activities**	0	3,168	1,129	0	0	4,297	0.08%
	Total	43,936	50,504	152,938	1,121,431	4,133,697	5,502,506	100.00%
	% contribution to export by establishment types	0.80%	0.92%	2.78%	20.38%	75.12%	100.00%	

Table 14 sheds light on the type of industrial establishments serving the local market, whose sales value is twice that reached in the export market. Large and major establishments capture 79 per cent of the local market (each group of establishments contributing roughly half of the total). Medium-large establishments contribute 10 per cent of total local market sales. Micro, micro-small and small-medium establishments contribute the remaining 11 per cent. Thus, differently from the export market, the local market plays an important role in the upgrading of a number of micro-small establishments (Figure 8).

Figure 8Local market sales by establishment type



If we focus on manufacturing sector, Table 14 shows that the local market is much less dominated by major establishments (500+ workers), while in fact large and major establishments contribute the same 40 per cent of the local market sales value. Medium-large establishments account for another 9 per cent, while the remaining 11 per cent is almost equally distributed among the other establishment types.

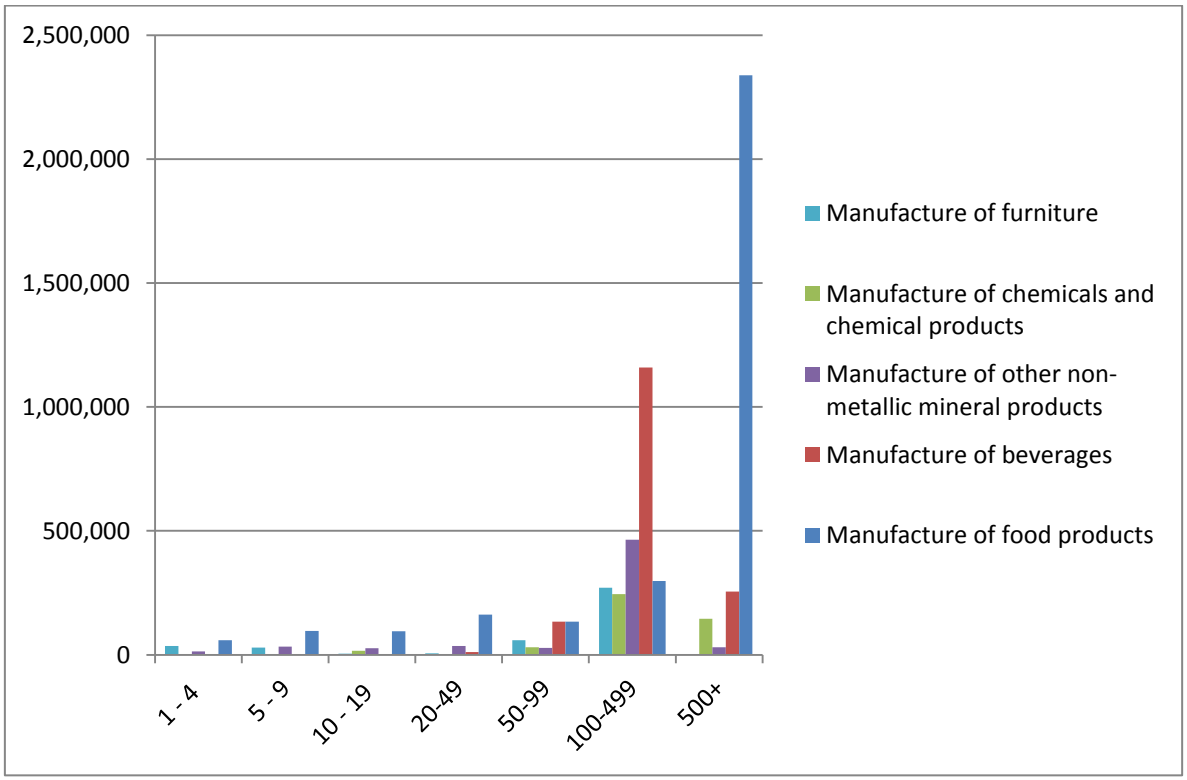
Table 14 Domestic sales by industry and establishment type

(Million TZS)

ISIC Rev 4	Industrial sub-sector	1 - 4	5 - 9	10 - 19	20-49	50-99	100-499	500+	Total	% tot domestic
05	Mining of coal and lignite	0	0	0	0	1,835	0	0	1,835	0.02%
07	Mining of metal ores	90	1,365	13,441	6,890	2,469	2,899	0	27,154	0.27%
08	Other mining and quarrying	634	4,053	20,586	65,951	17,963	26,460	0	135,649	1.35%
B	**Mining and quarrying**	725	5,418	34,027	72,841	22,267	29,359	0	164,637	1.64%
10	Manufacture of food products	58,491	96,423	94,829	162,885	133,716	298,255	2,337,561	3,182,160	31.77%
11	Manufacture of beverages	305	1,483	1,869	11,323	133,332	1,159,295	255,254	1,562,861	15.60%
12	Manufacture of tobacco products	5	81	0	0	0	3,582	380,784	384,452	3.84%
13	Manufacture of textiles	4,630	790	2,862	18,487	26,630	73,298	117,147	243,844	2.43%
14	Manufacture of wearing apparel	45,605	10,214	634	2,115	446	5,983	0	64,996	0.65%
15	Manufacture of leather and related products	1,303	872	150	2,589	18,585	16,786	0	40,285	0.40%
16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	9,452	9,807	7,314	3,634	5,276	0	31,263	66,744	0.67%
17	Manufacture of paper and paper products	43	137	174	9,188	14,252	21,575	17,986	63,355	0.63%
18	Printing and reproduction of recorded media	2,008	4,217	4,573	30,908	28,356	108,024	0	178,086	1.78%
19	Manufacture of coke and refined petroleum products	0	0	0	881	6,152	43,388	0	50,421	0.50%
20	Manufacture of chemicals and chemical products	455	1,042	16,137	2,299	30,827	244,493	145,649	440,902	4.40%
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	0	15	841	0	3,943	51,164	0	55,963	0.56%
22	Manufacture of rubber and plastics products	74	1,091	24,043	15,215	120,297	183,466	0	344,186	3.44%
23	Manufacture of other non-metallic mineral products	13,749	32,615	26,860	35,441	27,883	465,069	30,356	631,974	6.31%
24	Manufacture of basic metals	12	33	2,571	1,591	32,395	59,066	50,044	145,712	1.45%
25	Manufacture of fabricated metal products, except machinery and equipment	28,820	22,940	12,364	9,332	33,614	52,865	0	159,934	1.60%
26	Manufacture of computer, electronic and optical products	0	97	0	0	0	18,193	0	18,290	0.18%
27	Manufacture of electrical equipment	1,166	2,380	171	12,937	19,874	51,653	0	88,181	0.88%
28	Manufacture of machinery and equipment n.e.c.	728	2,231	3,230	3,838	2,298	0	0	12,323	0.12%
29	Manufacture of motor vehicles, trailers and semi-trailers	160	939	44	10,713	10,323	0	4,987	27,166	0.27%
30	Manufacture of other transport equipment	295	175	0	1,232	0	59,213	0	60,915	0.61%
31	Manufacture of furniture	35,629	29,629	4,567	6,744	59,262	271,091	0	406,920	4.06%
32	Other manufacturing	1,618	2,513	515	3,447	50,693	11,155	0	69,941	0.70%
33	Repair and installation of machinery and equipment	100	368	297	0	1,985	32,228	0	34,978	0.35%
C	**Manufacturing**	204,647	220,090	204,046	344,799	760,138	3,229,841	3,371,030	8,334,590	83.21%
35	Electricity, gas, steam and air conditioning supply	869	283	0	19,600	169,354	601,474	638,936	1,430,517	14.28%
D	**Electricity, gas, steam and air conditioning supply**	869	283	0	19,600	169,354	601,474	638,936	1,430,517	14.28%
36	Water collection, treatment and supply	871	1,600	10,410	11,416	24,133	36,060	0	84,489	0.84%
38	Waste collection, treatment and disposal activities; materials recovery	168	65	0	0	2,002	0	0	2,236	0.02%
E	**Water supply; sewerage, waste management and remediation activities**	1,039	1,665	10,410	11,416	26,135	36,060	0	86,725	0.87%
	Total	207,280	227,455	248,483	448,656	977,894	3,896,734	4,009,966	10,016,469	100.00%
	% contribution to domestic sales by establishment types	2.07%	2.27%	2.48%	4.48%	9.76%	38.90%	40.03%	100.00%	

The role different establishment types play also changes according to the manufacturing industry being considered. Table 14 and Figure 9 show that while the food industry serving the local market is dominated by major firms, the remaining four main manufacturing industries are in fact primarily served by large establishments (this is particularly the case for the manufacture of beverages and of other non-metallic mineral products). These figures confirm that the local market offers important sales opportunities for the growth of establishments, especially in key manufacturing industries.

Figure 9Local market sales for key manufacturing industries by establishment type



4 Industrial drivers

Industrial performance is driven by a number of factors related to the utilization of the existing production capacity, as well as the capacity of expanding the quantity and quality of the workforce, and thus the growth and employment distribution across industries and its composition in terms of skills. Investments in fixed assets to support the maintenance, expansion and upgrading of existing productive establishments, in particular, the investment in production technologies such as machineries and tools, is

another key driver. These factors and their organization in production will ultimately determine the productivity of establishments as well as the quality of their products.

Another important aspect captured in the census is the extent to which Tanzanian establishments rely on local or foreign suppliers for various raw industrial materials and intermediate products, such as components. The increasing development and integration of local establishments into the local production system via backward and forward linkages is a major driver of industrial transformation and medium-long term performance. As discussed in the TICR 2016, the development of these linkages represents the basis for increasing value added at the country level, and opportunities for scaling-up and specialization[7]. Finally, the contribution of different industries to the general taxation is indirectly an important driver of industrial development. The broadening of the tax base and the possibility for the government to collect resources for public goods investments is increasingly important for the collective efficiency of the local production system and for unlocking industrialization opportunities. The census provides data on all these dimensions.

4.1 Production capacity utilization by product, industry and firm size

Among its main findings, the CIP 2013 highlights how the majority of establishments operated under their respective installed capacities with an average production capacity utilization of 63 per cent. Indeed, while underutilization of the existing production capacity is a major drawback, Table 15 shows how the underutilization problem is very diverse both across industries and, more critically, across establishment types. Industries like tobacco, mining and quarrying, electrical equipment, machinery equipment production and their repair and maintenance, but also pharma operate above 70 per cent across almost all establishment types.

However, industries with an average or below average production capacity utilization have a higher variance, with large establishments (100-499) considerably outperforming smaller ones within the same industry. In the manufacture of other non-metallic mineral products as well as in chemical products, large establishments operate at above 80 per

[7] Hirschman, 1958 and 1977; (Andreoni 2018) provides a "generalised linkages model" to assess different types of linkages and changes in the configuration of the local production system

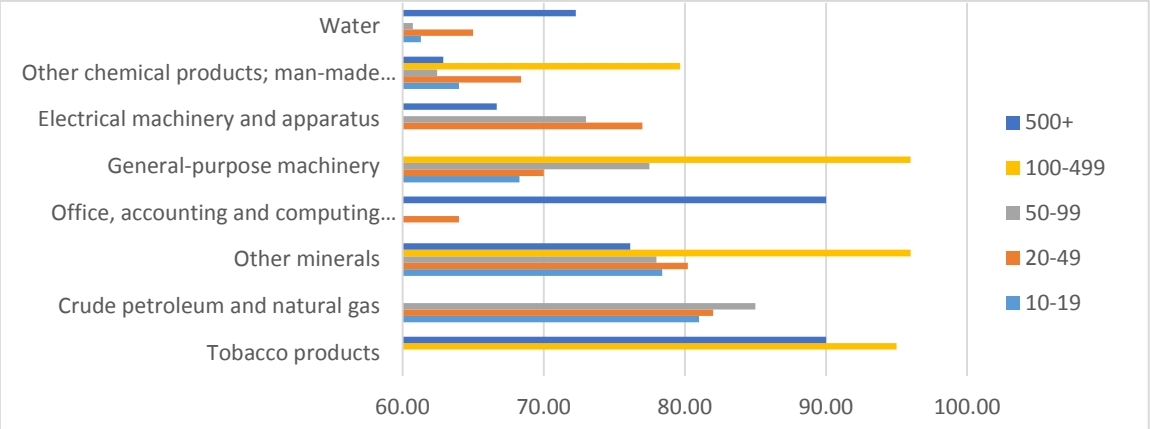
cent, while medium-large establishments operate at around 53 per cent. This suggests that there are industries in which production capacity utilization is highly correlated with establishment size. There are multiple explanations for this, which can be assessed for each industry when looking at the obstacles reported by the establishments. The issue is that a relatively large establishment size in a disarticulated production system like the Tanzanian one compensates for many of these obstacles – e.g. access to markets, credit, etc.

Figure 10 takes the reference average level of 60 per cent production capacity utilization and focuses on specific products. These include tobacco products, general purpose machinery, other minerals, crude petroleum and natural gas. While all establishment types for these products reaches the 60 per cent threshold, there is still a significant variance among them. Specifically, large establishments (100-499) outperform all other establishment types across all industries, signalling that at that scale level (100-499), the average production capacity utilization is generally higher. For the selected products in Figure 10, the production capacity utilization for these establishment types is far beyond 80 per cent. Interestingly, if we compare medium (20-49) and medium-large (50-99) establishments, though this high variance in production capacity utilization persists, smaller scale establishments are not always associated with lower levels of production capacity utilization in certain industries.

Table 15 Production capacity utilization by industry and establishment type

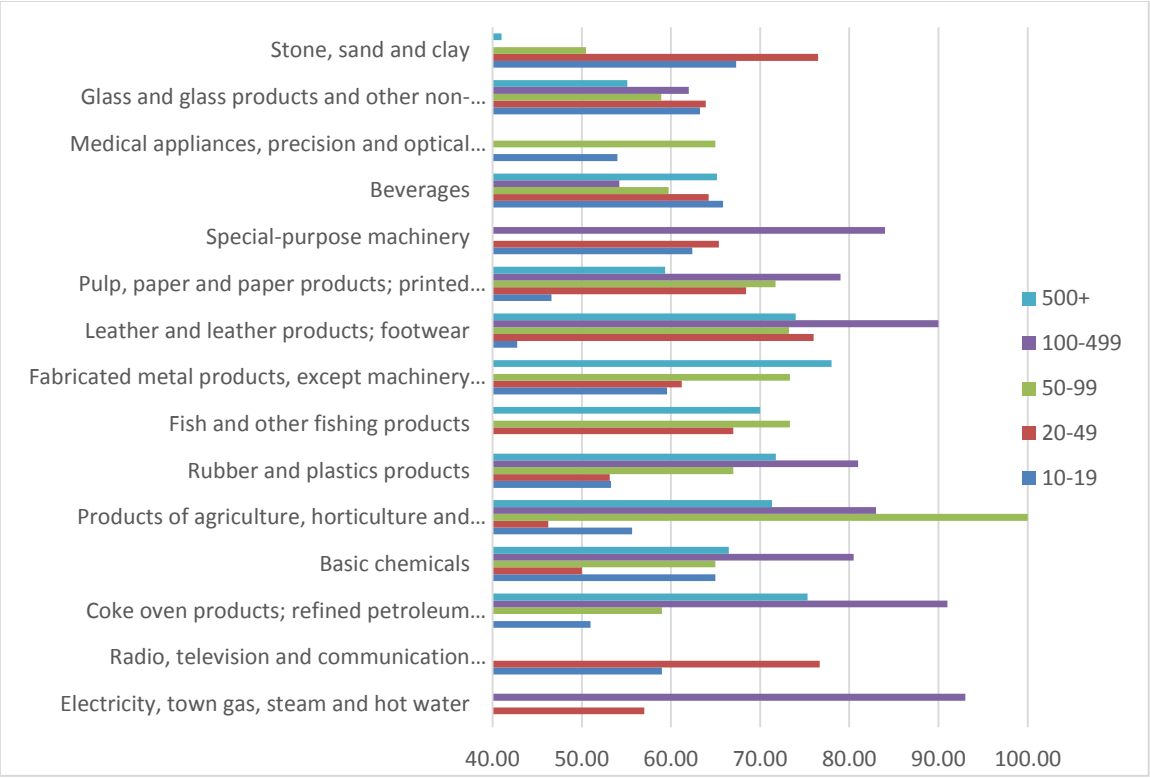
ISIC Rev 4	Activity	10-19	20-49	50-99	100-499	500+	Total
17	Manufacture of tobacco products	-	-	-	95.00	90.00	93.75
8	Waste collection, treatment and disposal activities; materials recovery	-	71.00	83.33	-	-	80.25
12	Other mining and quarrying	73.82	79.34	72.44	96.00	60.05	74.45
29	Manufacture of electrical equipment	-	71.83	76.00	-	70.75	72.71
10	Repair and installation of machinery and equipment	60.00	-	85.00	-	68.00	71.00
38	Electricity, gas, steam and air conditioning supply	-	57.00	77.50	-	-	70.67
35	Manufacture of basic pharmaceutical products and pharmaceutical preparations	76.25	-	79.00	-	59.20	70.54
24	Manufacture of machinery and equipment n.e.c.	66.15	73.63	100.00	-	-	70.40
22	Manufacture of other non-metallic mineral products	68.89	66.14	55.14	82.00	70.50	66.16
32	Manufacture of chemicals and chemical products	63.00	62.80	53.17	86.63	65.41	65.64
11	Printing and reproduction of recorded media	52.38	67.94	67.00	-	70.00	64.68
23	Manufacture of motor vehicles, trailers and semi-trailers	52.50	65.88	39.00	86.67	62.50	64.41
7	Water collection, treatment and supply	63.25	64.77	60.73	-	72.29	63.99
20	Manufacture of paper and paper products	51.00	76.25	76.71	79.00	35.60	63.89
19	Manufacture of rubber and plastics products	58.27	55.89	62.94	-	67.46	63.12
28	Manufacture of fabricated metal products, except machinery and equipment	59.14	60.08	70.77	-	72.00	62.76
18	Manufacture of textiles	66.17	41.42	56.00	79.77	55.79	60.00
33	Manufacture of beverages	51.43	60.33	58.50	52.17	65.16	59.69
13	Other manufacturing	50.00	54.13	53.75	-	72.86	59.29
27	Manufacture of food products	56.46	58.60	56.42	67.14	62.11	58.52
26	Manufacture of furniture	52.87	68.76	60.39	-	67.67	58.46
14	Mining of metal ores	53.36	55.14	63.50	82.50	54.50	58.33
16	Manufacture of wearing apparel	61.33	37.40	82.00	90.00	82.75	57.16
25	Manufacture of leather and related products	39.56	69.50	59.75	-	70.00	56.23
15	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	53.82	51.54	38.83	63.43	60.00	52.98
36	Manufacture of basic metals	34.14	42.50	73.20	70.00	56.71	52.59
31	Manufacture of coke and refined petroleum products	-	24.00	59.00	-	57.50	52.17
30	Manufacture of computer, electronic and optical products	-	-	-	-	47.00	47.00
21	Manufacture of other transport equipment	-	29.00	-	-	80.00	46.00
5	Mining of coal and lignite	-	-	25.00	-	-	25.00

Figure 10 **Industries with aproduction capacity utilization of above 60 per cent across all establishment types**



In Figure 11, the 40 per cent threshold was considered to present a broader view of the degree of variance in production capacity utilization across more products and for different establishment types. The existence of a high degree of variance in production capacity utilization calls for a tailored approach to the problem across a number of targeted industries, also in view of the different obstacles establishments face in using their production capacity.

Figure 11 **Industries with a production capacity utilization of above 40 per cent across all establishment types**



4.2 Employees and wages by establishment type and industry

The CIP 2013 provides information on the number and types of employees in the four industries. Employees are defined as persons who, during a specified period, work for an agreed amount of pay, either in cash or in kind, under the direction of the establishment's management. These include managerial and professional staff, operatives and other employees. Among establishments with more than 10 employees, 77.4 per cent of employees worked in manufacturing industries (105,516 employees); followed by mining and quarrying with 18,528 (13.6 per cent); electricity, gas, steam and air conditioning supply with 7,916 (5.8 per cent); and water supply; sewerage, waste management and remediation activity with 4,308 employees (3.2 per cent of the total industrial sub-sector). While in small establishments (1-9 employees), the majority (61,372; 98.0 per cent) of the total 62,656 employees were also employed in manufacturing industries; followed by mining and quarrying with 631 employees (1.0 per cent); while each of the remaining industries accounted for less than 1.0 per cent of total employees.

Thus, manufacturing plays a key role in job creation within the industrial sector, independently from establishment type. Specifically, among large establishments, the food products industry engaged a large number of workers (38,862) of whom 32,449 were operatives and 5,521 were managerial employees, followed by the manufacturing of textiles with 15,965 (of whom 15,116 were operatives and 824 were managerial employees) and the manufacturing of beverages with 6,808 workers. Among the small establishments, the most relevant industries in terms of employment are the manufacturing of furniture with 10,102 employees (of whom 8,629 were operatives and 1,158 were managerial) and the manufacturing of wearing apparel with 8,735 workers.

Table 16 complements these results by providing more disaggregated figures on type of employment—managerial, operatives, other, working proprietors and unpaid worker—among establishments of different size and industry. While it would be possible to apply the establishment type taxonomy adopted so far, we opted for a more parsimonious approach involving three types of establishments: the group including the micro and small establishments (1-9 employees); the group including small-medium, medium and

medium-large establishments (10-99 employees); and finally, the group 100+ employees, namely large and major establishments.

By increasing the size of an establishment, we can expect that the composition of the establishment workforce will have to change accordingly. In the industrial sector, we count 26,005 workers in managerial position and 169,429 as operatives in total. Thus, the ratio between managerial and operational employees is 1:15. In the mining and quarrying industry, however, given its capital intensive nature, this ratio is significantly lower and equal to 1:6. If we focus only on the manufacturing sector and compare the same ratio for large and small establishments, we find that large establishments report almost 19 operatives for each worker in a managerial position (the ratio is equal to 1:11 among small establishments). These figures confirm the absorption capacity of manufacturing with respect to operatives.

Within manufacturing, seven industries employ at least 80,000 workers, both managers and operatives. They are food, textiles, wearing apparel, wood (except furniture), other non-metallic mineral products, fabricated metal products (except machinery and equipment) and furniture. Among them, with the increasing size of the establishment, the ratio between managers and operatives tends to increase and generally reaches its pick between 1:20 and 1:35 with medium sized establishments (10-99 workers). In fabricated metal products (except machinery and equipment) and furniture establishments, the ratio is above 1:30 for large establishments as well.

Table 16 Number of employees by industry and establishment type

ISIC Rev 4	Industrial Activitty	Size Group	Managerial	Operatives	Other	Working Proprietors	Unpaid Worker	Total Person Engaged
05	Mining of coal and lignite	10-99	8	69	0	0	0	77
07	Mining of metal ores	1-9	3	52	1	11	7	74
07		10-99	47	448	33	39	1	568
07		100+	306	8,888	0	2	4	9,201
08	Other mining and quarrying	1-9	52	512	11	249	91	915
08		10-99	281	4,061	105	175	15	4,638
08		100+	453	3,752	74	28	126	4,434
10	Manufacture of food products	1-9	1,927	22,618	456	15,109	5,188	45,299
10		10-99	1,271	6,002	80	454	377	8,184
10		100+	4,250	26,447	812	336	2	31,847
11	Manufacture of beverages	1-9	27	84	0	30	4	145
11		10-99	313	675	28	22	20	1,058
11		100+	1,104	4,670	18	8	0	5,801
12	Manufacture of tobacco products	1-9	0	43	0	4	2	49
12		100+	729	4,310	21	0	0	5,061
13	Manufacture of textiles	1-9	115	552	18	729	234	1,648
13		10-99	114	306	25	37	59	541
13		100+	710	14,810	0	5	1	15,525
14	Manufacture of wearing apparel	1-9	1,141	7,240	354	13,879	6,181	28,795
14		10-99	71	208	0	19	6	304
14		100+	97	1,342	0	0	0	1,439
15	Manufacture of leather and related products	1-9	31	242	8	178	51	510
15		10-99	88	560	0	3	2	654
15		100+	142	326	12	1	80	561
16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	1-9	398	3,070	71	1,688	422	5,649
16		10-99	254	959	31	88	10	1,341
16		100+	337	1,960	131	0	0	2,428
17	Manufacture of paper and paper products	1-9	5	16	0	4	0	25
17		10-99	70	387	8	7	0	473
17		100+	87	1,668	0	0	0	1,755
18	Printing and reproduction of recorded media	1-9	57	295	3	116	19	490
18		10-99	363	776	0	47	7	1,194
18		100+	545	1,055	56	0	0	1,655
19	Manufacture of coke and refined petroleum products	10-99	10	95	0	1	0	106
19		100+	62	74	0	1	0	137
20	Manufacture of chemicals and chemical products	1-9	22	163	6	59	15	265
20		10-99	232	466	1	73	65	836
20		100+	1,306	4,233	0	5	0	5,544
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	1-9	0	6	0	2	4	12
21		10-99	29	56	0	0	2	87
21		100+	160	529	0	2	0	691
22	Manufacture of rubber and plastics products	1-9	0	63	3	18	14	99
22		10-99	253	804	0	15	5	1,077
22		100+	479	2,683	0	4	0	3,167
23	Manufacture of other non-metallic mineral products	1-9	285	3,300	112	955	184	4,836
23		10-99	282	1,536	30	117	33	1,998
23		100+	285	2,262	0	3	0	2,550
24	Manufacture of basic metals	1-9	2	14	0	3	1	20
24		10-99	95	285	4	4	0	388
24		100+	203	1,561	0	1	21	1,786
25	Manufacture of fabricated metal products, except machinery and equipment	1-9	625	6,468	183	3,850	1,574	12,700
25		10-99	250	887	20	59	22	1,238
25		100+	195	586	168	2	0	951
26	Manufacture of computer, electronic and optical products	1-9	5	3	0	1	0	9
26		100+	9	96	3	7	0	115
27	Manufacture of electrical equipment	1-9	49	354	12	309	68	791
27		10-99	192	264	0	4	0	460
27		100+	87	403	0	0	0	490
28	Manufacture of machinery and equipment n.e.c.	1-9	33	210	9	87	29	367
28		10-99	87	254	1	5	11	358
29	Manufacture of motor vehicles, trailers and semi-trailers	1-9	9	82	0	20	7	119
29		10-99	115	321	0	4	0	439
29		100+	334	499	0	0	0	833
30	Manufacture of other transport equipment	1-9	4	57	0	64	6	131
30		10-99	21	20	0	0	0	41
30		100+	83	73	0	1	1	158
31	Manufacture of furniture	1-9	1,158	8,629	314	7,805	2,855	20,762
31		10-99	285	993	5	110	31	1,424
31		100+	401	1,149	0	2	0	1,553
32	Other manufacturing	1-9	98	252	3	169	21	543
32		10-99	144	292	82	4	5	527
32		100+	199	438	0	2	0	639
33	Repair and installation of machinery and equipment	1-9	10	56	0	23	12	101
33		10-99	8	68	0	0	0	76
33		100+	7	234	0	0	0	241
35	Electricity, gas, steam and air conditioning supply	1-9	19	182	4	102	27	335
35		10-99	103	296	1	0	0	400
35		100+	889	6,557	70	0	0	7,515
36	Water collection, treatment and supply	1-9	58	377	1	99	96	632
36		10-99	708	1,603	103	1	11	2,425
36		100+	695	974	0	0	0	1,669
38	Waste collection, treatment and disposal activities; materials recovery	1-9	2	10	0	3	0	14
38		10-99	21	204	0	2	0	228
	Total		26,005	169,429	3,491	47,271	18,028	264,223

Increasing wages are an indicator of industrial development, as they are generally associated with more formal employment as well as increasing productivity. As reported in Table 17, the average wages overall reflect the industries' different levels of development, with the most advanced industries like tobacco, pharma, chemicals and other non-metallic mineral products showing the highest wages on average.

Table 17 Average wages by industry and establishment type

Level2	ISICREV4_L2.Description	1-4	5-9	10-19	20-49	50-99	100-499	500+	Total
05	Mining of coal and lignite	0	0	0	0	3850.597	0	0	3850.597
07	Mining of metal ores	1566.667	1493.2	2075.956	3290.516	7724.497	3528.086	7959.154	7206.171
08	Other mining and quarrying	1472.461	1170.571	1926.436	1509.317	2282.592	1753.95	14283.15	3481.823
10	Manufacture of food products	900.9562	1252.739	1769.358	2351.47	3635.969	2472.985	4399.478	2584.019
11	Manufacture of beverages	1209.955	1270.042	1813.258	3475.493	9952.783	19420.8	6294.666	14616.48
12	Manufacture of tobacco products	1133.333	917.4356	0	0	0	3517.246	9027	8827.886
13	Manufacture of textiles	1956.758	1098.709	5635.185	3107.794	3645.928	1534.269	2111.407	2027.619
14	Manufacture of wearing apparel	1536.01	1077.057	2638.927	1753.022	1737.365	1427.647	2642.783	1572.757
15	Manufacture of leather and related products	2495.775	1441.72	2276.977	1480.714	1916.154	2395.068	0	2023.566
16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting	1520.393	1279.039	1817.927	2340.24	3290.285	3072	2148.372	1841.905
17	Manufacture of paper and paper products	1624	956.6364	3600	2351.711	3111.146	2903.948	3952.191	3585.928
18	Printing and reproduction of recorded media	2649.063	2147.291	3576.814	4998.018	8919.769	5307.096	0	5109.019
19	Manufacture of coke and refined petroleum	0	0	0	2428.8	1029.588	7013.493	0	4522.515
20	Manufacture of chemicals and chemical	1449.763	1097.171	5436.877	1593.258	9421.113	3372.37	5037.501	4499.578
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	0	241.6667	2108.333	0	5524.753	4932.776	0	4908.637
22	Manufacture of rubber and plastics products	1945.286	1988.659	3119.19	3025.285	2722.381	4326.867	0	3927.886
23	Manufacture of other non-metallic mineral	2093.518	1822.39	2278.971	2761.018	2650.103	16307.36	4864.187	5479.482
24	Manufacture of basic metals	732	2574.545	2788.182	3073.171	1672.184	1774.257	3096.115	2120.997
25	Manufacture of fabricated metal products, except machinery and equipment	1590.994	1423.823	2356.584	3032.344	4769.066	2157.435	0	1842.408
26	Manufacture of computer, electronic and	0	3106.5	0	0	0	26488.89	0	24876.13
27	Manufacture of electrical equipment	1733.35	1748.877	3946.25	1051.965	11802.84	3360.938	0	2957.962
28	Manufacture of machinery and equipment	1825.502	2085.737	3409.749	2631.553	12023.39	0	0	4687.098
29	Manufacture of motor vehicles, trailers and	2766	2231.222	1258.25	2331.076	2926.664	2014.75	5659.371	4107.426
30	Manufacture of other transport equipment	1089.905	1293.333	0	1712.561	0	9241.301	0	6129.568
31	Manufacture of furniture	1581.092	1524.905	1899.683	1805.323	2304.977	6177.02	0	2163.337
32	Other manufacturing	1828.48	1913.878	2501.538	2694.118	2041.354	2557.371	0	2279.194
33	Repair and installation of machinery and	1755.882	2318.235	1809.435	0	3437.792	6391.921	0	4975.088
35	Electricity, gas, steam and air conditioning	800.426	1274.286	0	19223.9	18372.48	16347.43	21881.87	18531.82
36	Water collection, treatment and supply	1071.882	979.2813	2568.439	3721.315	6143.665	5900.06	0	4745.749
38	Waste collection, treatment and disposal activities; materials recovery	720	1928.571	0	2192.306	1813.623	0	0	1874.227

However, these averages are greatly determined by the composition of the workforce in the different industries, both in terms of employment categories discussed above and others, such as gender and different skill levels (Figure 12 and 13). As regards gender, there is a higher number of male workers across all main industries, as well as across different establishment types. In particular, the proprietor, managerial and skilled operative categories, which are characterized by significantly higher wages, are

dominated by male employees. Figure 13 illustrates the composition by gender and employment category for the most important industries as for number of employees, that is, the food industry. These figures suggest a relatively high variance in terms of wages across these different groups of employees.

Figure 12 Employment categories and gender across different establishment types

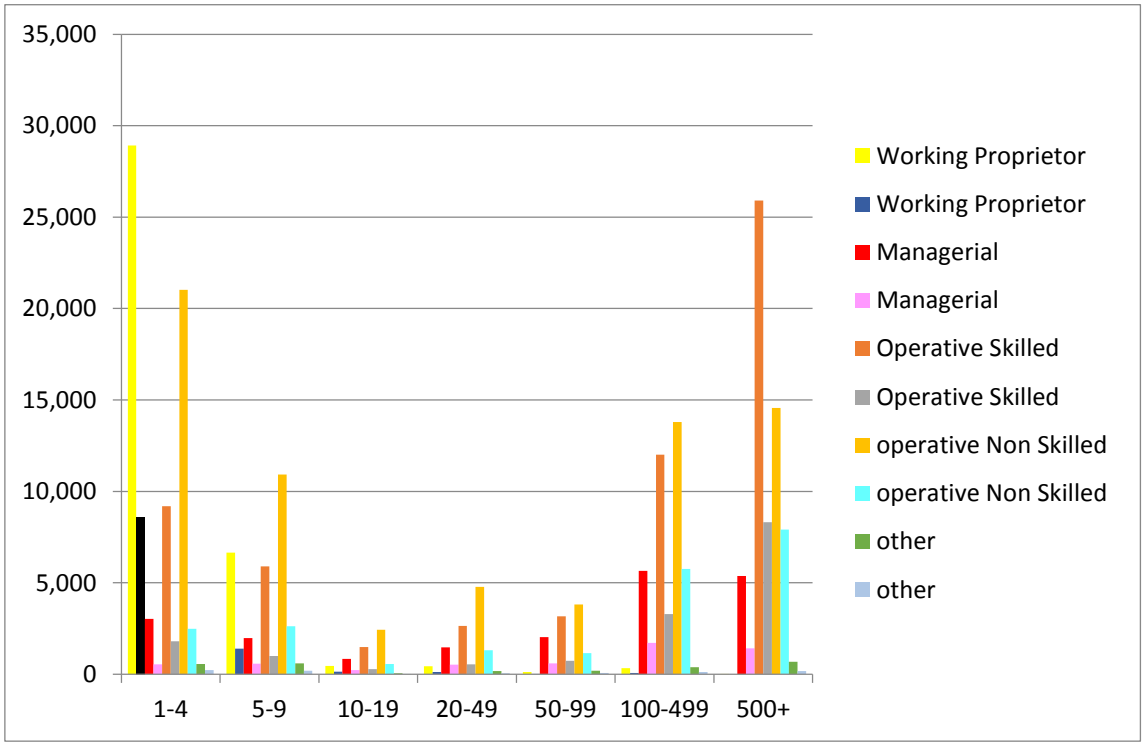
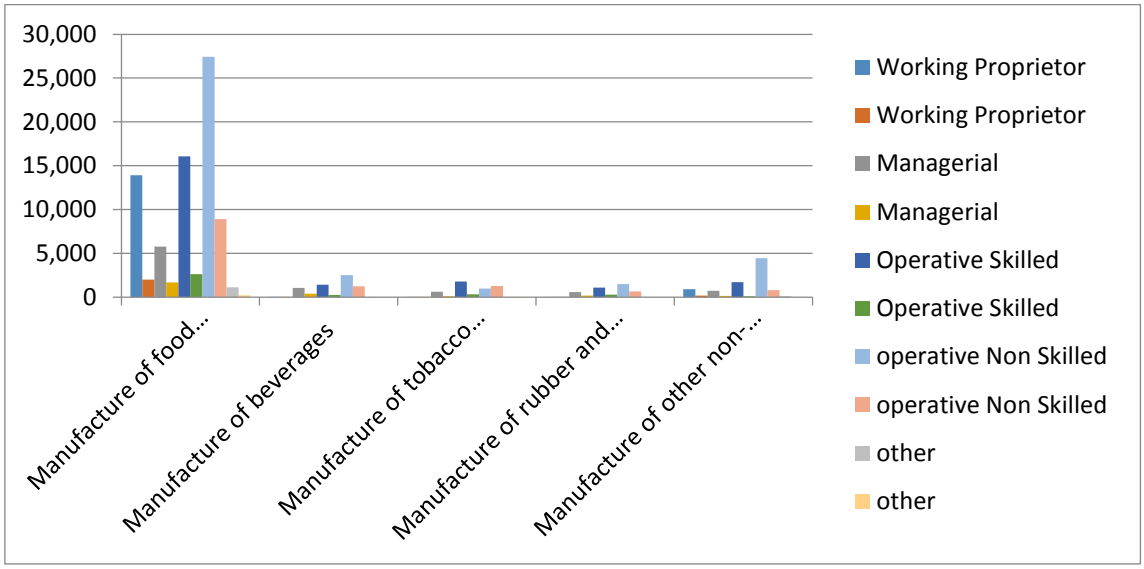


Figure 13 Employment categories and gender in major manufacturing industries



4.3 Skilled and unskilled operatives by industry and establishment type

In 2013, the industrial sector employed more unskilled operatives (95,160; 55.0 per cent) than skilled ones (76,891; 45.0 per cent of total number of operatives). Table 18 accounts for variations in skill levels among operatives in different industries and establishments of different sizes. We found that operative skilled workers are largely concentrated in large establishments, especially in the mining and quarrying industry (91 per cent). There is a higher distribution of skilled workers among small and medium establishments accounting for 30 per cent and 11 per cent of workers, respectively. This is especially evident for small establishments involved in the manufacturing of wearing apparel, fabricated metal products (except machinery and equipment) and the furniture industry. Operative unskilled workers are primarily concentrated in the food industry, with 20 per cent of total of unskilled workers in small establishments (1-9 workers) and another 23 per cent in medium and large establishments.

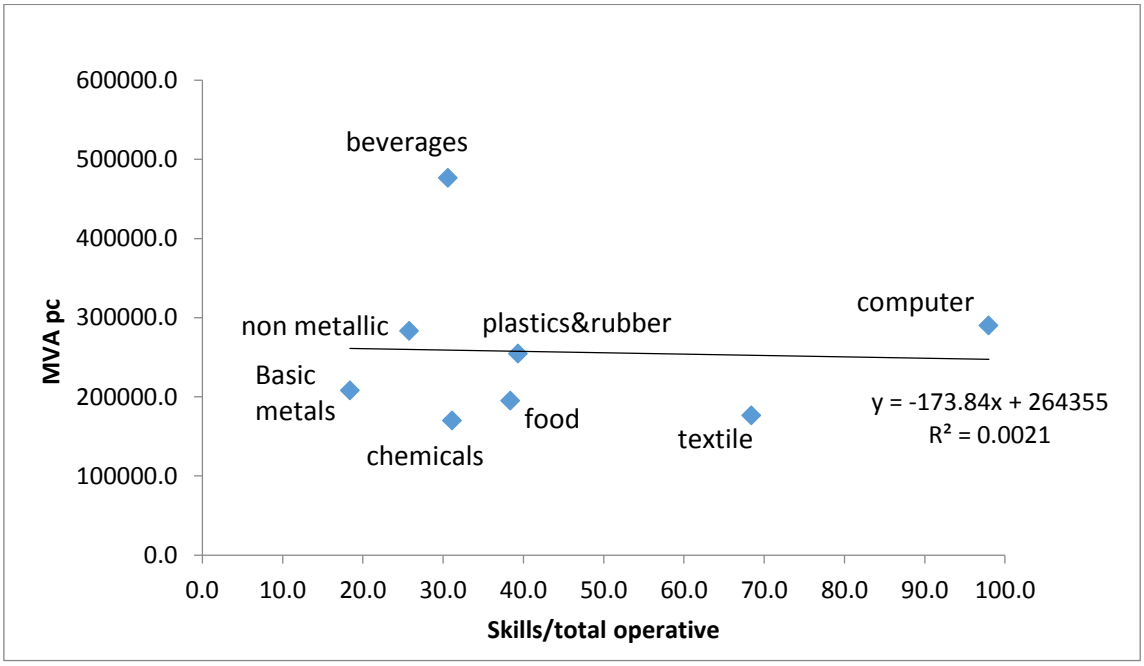
The ratio between operative skilled and operative unskilled workers in the total number of employees for the different industries follow a consistent pattern. The operative skilled ratio goes from 0.3 to 0.4 and 0.5, progressing, respectively, from small to medium and finally to large establishments. The positive correlation between increasing establishment size and increasing presence of operative skilled workers (in particular, in the progression from medium to large establishments) is particularly strong in the manufacture of wearing apparel, pharmaceutical products, repair and installation of machinery and equipment and other transport equipment. By contrast, the ratio of unskilled operatives is consistently higher among small and medium establishments and decreases for large ones (from 0.8 to 0.3 for mining and quarrying, and from 0.7 to 0.5 for manufacturing).

Table 18 Number of operatives by skill level, industry and establishment type

ISIC Rev 4	Industrial Activity	Operative Skilled			Tot	Operative Non Skilled			Tot	Total			Total	Skilled / Tot			Non Skilled / Tot		
		1-9	10-99	100+		1-9	10-99	100+		1-9	10-99	100+	ALL	1-9	10-99	100+	1-9	10-99	100+
05	Mining of coal and lignite	0	6	0	6	0	63	0	63	0	69	0	69		0.1			0.9	
07	Mining of metal ores	20	48	8,470	8,538	32	401	418	851	52	448	8,888	9,389	38%	11%	95%	62%	89%	5%
08	Other mining and quarrying	70	745	849	1,664	443	3,316	2,904	6,662	512	4,061	3,752	8,326	14%	18%	23%	86%	82%	77%
B	**Mining and Quarrying**	**90**	**799**	**9,319**	10,208	**475**	**3,779**	**3,322**	7,576	**564**	**4,579**	**12,641**	**17,784**	**16%**	**17%**	**74%**	**84%**	**83%**	**26%**
10	Manufacture of food products	5,383	2,029	11,301	18,712	17,235	3,973	15,146	36,355	22,618	6,002	26,447	55,067	24%	34%	43%	76%	66%	57%
11	Manufacture of beverages	26	275	1,361	1,663	58	399	3,310	3,767	84	675	4,670	5,430	31%	41%	29%	69%	59%	71%
12	Manufacture of tobacco products	29	0	2,081	2,110	13	0	2,229	2,243	43	0	4,310	4,353	68%		48%	32%		52%
13	Manufacture of textiles	233	177	10,312	10,722	319	130	4,498	4,946	552	306	14,810	15,668	42%	58%	70%	58%	42%	30%
14	Manufacture of wearing apparel	3,331	121	1,246	4,698	3,910	87	96	4,093	7,240	208	1,342	8,791	46%	58%	93%	54%	42%	7%
15	Manufacture of leather and related products	88	293	150	531	153	267	177	597	242	560	326	1,128	37%	52%	46%	63%	48%	54%
16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	1,158	378	596	2,133	1,912	580	1,364	3,856	3,070	959	1,960	5,988	38%	39%	30%	62%	61%	70%
17	Manufacture of paper and paper products	16	164	825	1,005	0	224	842	1,066	16	387	1,668	2,072	100%	42%	49%	0%	58%	51%
18	Printing and reproduction of recorded media	153	364	543	1,060	142	412	512	1,066	295	776	1,055	2,125	52%	47%	51%	48%	53%	49%
19	Manufacture of coke and refined petroleum products	0	72	26	98	0	23	48	71	0	95	74	169		76%	35%		24%	65%
20	Manufacture of chemicals and chemical products	47	203	1,263	1,512	116	263	2,970	3,349	163	466	4,233	4,861	29%	44%	30%	71%	56%	70%
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	2	23	412	437	4	33	117	154	6	56	529	591	33%	41%	78%	67%	59%	22%
22	Manufacture of rubber and plastics products	25	328	1,045	1,397	39	477	1,638	2,154	63	804	2,683	3,551	39%	41%	39%	61%	59%	61%
23	Manufacture of other non-metallic mineral products	788	384	658	1,830	2,512	1,152	1,604	5,267	3,300	1,536	2,262	7,098	24%	25%	29%	76%	75%	71%
24	Manufacture of basic metals	8	143	191	342	6	142	1,370	1,518	14	285	1,561	1,860	57%	50%	12%	43%	50%	88%
25	Manufacture of fabricated metal products, except machinery and equipment	2,236	608	402	3,246	4,233	279	184	4,695	6,468	887	586	7,941	35%	69%	69%	65%	31%	31%
26	Manufacture of computer, electronic and optical products	2	0	95	97	1	0	1	2	3	0	96	99	67%		99%	33%		1%
27	Manufacture of electrical equipment	136	166	141	443	218	98	262	578	354	264	403	1,021	38%	63%	35%	62%	37%	65%
28	Manufacture of machinery and equipment n.e.c.	100	226	0	326	110	28	0	138	210	254	0	465	47%	89%		53%	11%	
29	Manufacture of motor vehicles, trailers and semi-trailers	28	241	178	446	54	80	321	456	82	321	499	902	34%	75%	36%	66%	25%	64%
30	Manufacture of other transport equipment	15	20	30	65	42	0	43	85	57	20	73	150	27%	100%	41%	73%	0%	59%
31	Manufacture of furniture	3,603	454	962	5,019	5,026	539	187	5,752	8,629	993	1,149	10,771	42%	46%	84%	58%	54%	16%
32	Other manufacturing	170	102	355	627	83	190	83	356	252	292	438	982	67%	35%	81%	33%	65%	19%
33	Repair and installation of machinery and equipment	24	6	222	252	32	62	12	106	56	68	234	358	43%	9%	95%	57%	91%	5%
C	**Manufacturing**	**17,600**	**6,778**	**34,395**	58,773	**36,218**	**9,437**	**37,014**	82,668	**53,818**	**16,214**	**71,409**	**141,441**	**33%**	**42%**	**48%**	**67%**	**58%**	**52%**
35	Electricity, gas, steam and air conditioning supply	77	261	5,133	5,471	106	35	1,424	1,564	182	296	6,557	7,035	42%	88%	78%	58%	12%	22%
D	**Electricity, gas, steam and air conditioning supply**	**77**	**261**	**5,133**	5,471	**106**	**35**	**1,424**	1,564	**182**	**296**	**6,557**	7,035	**42%**	**88%**	**78%**	**58%**	**12%**	**22%**
36	Water collection, treatment and supply	124	990	684	1,798	253	613	290	1,156	377	1,603	974	2,954	33%	62%	70%	67%	38%	30%
38	Waste collection, treatment and disposal activities; materials recovery	0	17	0	17	10	187	0	197	10	204	0	214	0%	8%		100%	92%	
E	**Water supply; sewerage, waste management and remediation activities**	**124**	**1,007**	**684**	1,815	**263**	**800**	**290**	1,353	**387**	**1,807**	**974**	3,168	**32%**	**56%**	**70%**	**68%**	**44%**	**30%**
	Total	**17,891**	**8,845**	**49,531**	76,267	**37,060**	**14,051**	**42,050**	93,161	**54,951**	**22,896**	**91,581**	**169,428**	**33%**	**39%**	**54%**	**67%**	**61%**	**46%**

While skills are industry-specific and an operative skilled worker in one industry can therefore not be easily compared with the same in another industry, Figure 14 examines the relationship between MVA per capita and share of skilled operatives for each industry. The higher the share of skilled operatives, the higher we expect their value added in manufacturing industries. Across the industrial sector, the regression line suggests that more skilled operatives alone do not have a strong impact on MVA per capita. This suggests that while skills are critical, more and better skills are not sufficient to increase MVA per capita, as MVA is determined by the way skills are deployed in productive organizations. The development of organizational capabilities across different industries is a major industrial policy target, in particular, the development of capabilities in running increasingly complex and large-scale production operations[8].

Figure 14 Relationship between MVA per capita and share of skilled operatives



[8] See Andreoni 2011 and 2014 for a discussion on the role of different types of capabilities in production organizations.

4.4 Total fixed assets, machinery and automation by industry and establishment type

Fixed asset, also known as non-current assets or property, a plant and equipment, is a term used in accounting for assets and property which cannot easily be converted into cash. Fixed assets are subject to periodic depreciation (for tangible assets) or amortization (for intangible assets), impairment write-downs (if the value of an asset falls below its net book value) and disposition (once assets are disposed off). A fixed asset appears in the financial records at its net book value, which is its cost at the beginning of the accounting period, plus additions, less disposals and less depreciation, during the accounting period. In this regard, the CIP 2013 found that in large establishments, the total value of fixed assets at the beginning of 2013 was TZS 63,220,390 million, out of which infrastructure such as electricity, gas, steam and air conditioning supply represented the largest share (TZS 54,241,646 million; 85.8 per cent), followed by manufacturing (TZS 4,804,307million; 7.6 per cent), mining and quarrying (TZS 3,805,649 million; 6.0 per cent) and water supply; sewerage, waste management and remediation activities with TZS 368,789 million (0.6 per cent). At the end of 2013, this sectoral distribution of fixed assets remained basically the same, with the manufacturing sector characterized by a very low stock of fixed assets.

Table 19 provides more detailed information on the type of fixed assets in different industries and Table 20 further disaggregates these figures by considering different types of establishments. The electricity, gas, steam and air conditioning supply industries represent nearly 86 per cent of all fixed assets in the industrial sector. This is mainly constituted by building and structures accounting for 87 per cent of total fixed assets in the industry. In the manufacturing industry, which represents 7.6 per cent of all fixed assets, half are machinery and equipment. Beverages accounts for almost one-third of all machinery and equipment in manufacturing, followed by the manufacturing of other food products. The mining and quarrying industry accounts for only 5.9 per cent of total fixed assets, 40 per cent being constituted by machinery and equipment. Machinery and equipment account for less than 10 per cent of fixed assets in the overall industrial sector, while buildings and structures comprises 78 per cent.

Table 19 Value **of fixed assets at the end of 2013 by industrial activity and asset type**

(000 Tshs)

ISIC Rev.4	Industrial Activity	Land improvement	Buildings & structures	Transport equipment	Machinery & equipment	Computer and other data processing equipments	Other	Total
B	**Mining and quarrying**	**225,662**	**822,973**	**148,820**	**1,537,037**	**18,845**	**1,052,312**	**3,805,649**
101	Processing and preserving of meat	3,900	28,402	339	4,168	75	100	36,983
102	Processing and preserving of fish, crustaceans and molluscs	802	45,476	6,062	27,912	203	2,348	82,803
103	Processing and preserving of fruit and vegetables	1,365	1,471	977	3,320	70	324	7,525
104	Manufacture of vegetable and animal oils and fats	18,795	30,845	7,646	77,182	229	627	135,324
105	Manufacture of dairy products	604	6,037	1,420	5,769	243	41	14,113
106	Manufacture of grain mill products, starches and starch products	49,721	180,104	95,501	125,249	3,178	829	454,582
107	Manufacture of other food products	44,046	239,220	31,706	323,720	38,971	38,525	716,188
108	Manufacture of prepared animal feeds	612	8,498	482	2,602	14	76	12,285
110	Manufacture of beverages	12,933	181,541	53,781	709,935	13,428	169,804	1,141,423
120	Manufacture of tobacco products	1,435	41,601	8,393	94,473	1,956	24,664	172,522
131	Spinning, weaving and finishing of textiles	2,450	10,986	1,467	110,918	8,582	28	134,432
139	Manufacture of other textiles	7,817	60,226	2,047	118,598	208	2,729	191,625
141	Manufacture of wearing apparel, except fur apparel	13,065	429	19,340	66,248	115	7,512	106,709
143	Manufacture of knitted and crocheted apparel	100	609	0	53	5	0	767
151	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery and harness; dressing and dyeing of fur	30	507	42	1,271	21	44	1,916
152	Manufacture of footwear	12	2,536	366	3,041	53	120	6,128
161	Sawmilling and planing of wood	420	10,829	6,109	29,515	20	10,812	57,704
162	Manufacture of products of wood, cork, straw and plaiting materials	118	1,239	274	5,536	3	43	7,213
170	Manufacture of paper and paper products	14,790	30,364	5,375	78,675	882	58,100	188,186
181	Printing and service activities related to printing	2,450	20,463	3,148	74,514	935	668	102,177
182	Reproduction of recorded media	0	0	1	2,081	62	201	2,345
192	Manufacture of refined petroleum products	301	143	479	5,327	22	776	7,047
201	Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics and synthetic rubber in primary forms	412	7,213	2,589	23,859	37	997	35,107
202	Manufacture of other chemical products	2,516	45,534	4,410	48,887	1,632	1,304	104,284
210	Manufacture of pharmaceuticals, medicinal chemical and botanical products	10,153	9,269	255	8,914	75	904	29,570
221	Manufacture of rubber products	0	181	97	737	11	32	1,057
222	Manufacture of plastics products	9,782	31,014	3,702	84,520	684	5,385	135,089
231	Manufacture of glass and glass products	0	21,092	946	71,050	134	10	93,232
239	Manufacture of non-metallic mineral products n.e.c.	9,585	136,907	22,089	217,754	995	57,064	444,394
241	Manufacture of basic iron and steel	15,744	13,488	5,392	21,445	236	444	56,748
242	Manufacture of basic precious and other non-ferrous metals	0	1,066	103	1,052	0	11	2,232
251	Manufacture of structural metal products, tanks, reservoirs and steam generators	573	3,661	9,943	15,750	539	2,737	33,203
259	Manufacture of other fabricated metal products; metalworking service activities	501	49,472	634	9,240	397	224	60,469
261	Manufacture of electronic components and boards	0	2,404	0	5,782	70	0	8,256
271	Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus	0	77	1	0	0	124	202
272	Manufacture of batteries and accumulators	0	421	40	1,888	0	84	2,433
273	Manufacture of wiring and wiring devices	0	989	157	2,409	3	134	3,691
275	Manufacture of domestic appliances	758	2,887	710	303	31	103	4,794
279	Manufacture of other electrical equipment	0	15,498	320	5,205	0	122	21,145
282	Manufacture of special-purpose machinery	3,717	1,664	415	1,811	750	135	8,493
292	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	0	4,588	906	1,289	1,208	38	8,028
293	Manufacture of parts and accessories for motor vehicles	12,638	21,706	241	2,113	150	42	36,892
301	Building of ships and boats	163	0	28	185	7	8	391
309	Manufacture of transport equipment n.e.c.	169	6,814	987	1,025	76	309	9,379
310	Manufacture of furniture	3,090	22,618	4,040	71,655	1,011	1,716	104,130
321	Manufacture of jewellery, bijouterie and related articles	0	0	0	45	0	0	45
324	Manufacture of games and toys	25	471	0	35	1	12	543
329	Other manufacturing n.e.c.	36	781	564	11,331	66	348	13,127
331	Repair of fabricated metal products, machinery and equipment	90	230	37	7,016	0	2	7,374
C	**Manufacturing**	**245,719**	**1,301,569**	**303,562**	**2,485,408**	**77,388**	**390,660**	**4,804,307**
D	**Electricity, gas, steam and air conditioning supply**	**5,388,176**	**47,125,387**	**95,005**	**1,593,306**	**39,754**	**18**	**54,241,646**
E	**Water supply; sewerage, waste management and remediation activities**	**33,124**	**74,465**	**13,417**	**101,270**	**1,852**	**144,661**	**368,789**
	Total	**5,892,682**	**49,324,394**	**560,804**	**5,717,021**	**137,839**	**1,587,651**	**63,220,390**
	Percentage	**9.3**	**78.0**	**0.9**	**9.0**	**0.2**	**2.5**	**100.0**

Table 20 reveals the distribution of fixed assets in terms of machinery and equipment among different industries and for different establishment sizes. In the manufacturing industry, fixed assets are primarily concentrated in large and major establishments (100+ workers), accounting for 82 per cent of all machinery and equipment in manufacturing. However, in contrast to the mining and quarrying industry where medium establishments report insignificant values for machinery and equipment (1 per cent of the industry's total), we also find a certain amount of machinery and equipment

in medium establishments in the manufacturing industry (10-99 workers), equal to 18 per cent of the total in the manufacturing industry.

Table 20 Value of machinery and equipment at the end of 2013 by industry and establishment size

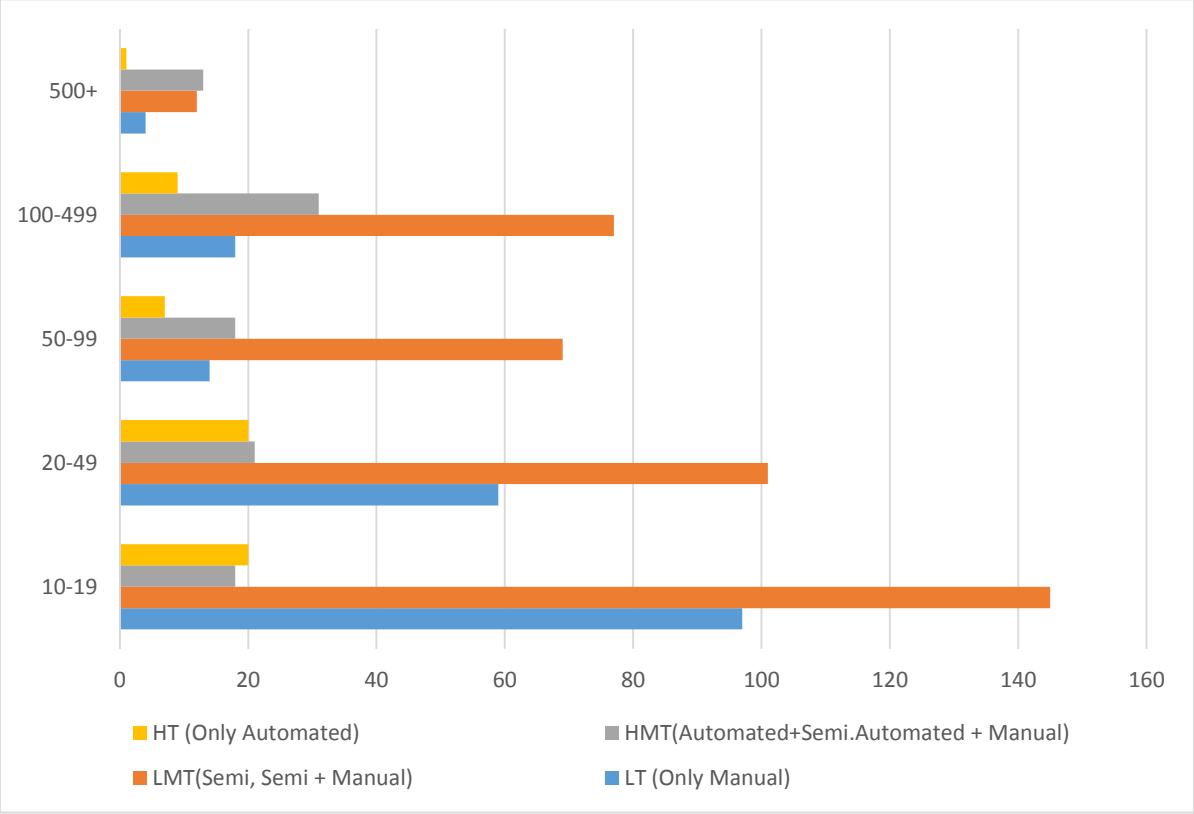
Level2	Description	10-19	20-49	50-99	100-499	500+	Total
05	Mining of coal and lignite	0	0	13,536	0	0	13,536
07	Mining of metal ores	160,727	238,562	72,211	348,550,110	1,042,786,758	1,391,808,368
08	Other mining and quarrying	2,867,753	7,044,259	7,942,705	29,228,391	98,131,678	145,214,786
10	Manufacture of food products	8,559,829	49,040,620	38,875,822	68,105,490	405,339,729	569,921,490
11	Manufacture of beverages	830,318	4,844,805	111,023,617	568,193,894	25,042,689	709,935,323
12	Manufacture of tobacco products	0	0	0	2,025,553	92,447,173	94,472,726
13	Manufacture of textiles	171,542	1,024,776	21,157,798	29,999,390	177,162,103	229,515,608
14	Manufacture of wearing apparel	67,046	65,247,891	7,075	214,171	764,872	66,301,056
15	Manufacture of leather and related products	182,920	275,017	1,467,429	2,386,711	0	4,312,077
16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	718,218	2,475,281	4,858,095	128,820	26,870,031	35,050,443
17	Manufacture of paper and paper products	524	1,474,390	2,458,190	11,531,319	63,211,071	78,675,494
18	Printing and reproduction of recorded media	2,518,040	8,499,117	9,349,138	56,228,730	0	76,595,026
19	Manufacture of coke and refined petroleum products	0	177,695	2,701,109	2,448,365	0	5,327,169
20	Manufacture of chemicals and chemical products	1,606,273	1,736,902	7,216,158	34,554,112	27,632,696	72,746,140
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	21,610	0	464,705	8,428,063	0	8,914,378
22	Manufacture of rubber and plastics products	5,636,871	3,640,026	11,512,489	64,467,819	0	85,257,205
23	Manufacture of other non-metallic mineral products	4,880,958	8,165,278	6,756,303	198,156,992	70,844,144	288,803,674
24	Manufacture of basic metals	83,591	70,137	3,791,310	14,301,007	4,251,450	22,497,494
25	Manufacture of fabricated metal products, except machinery and equipment	11,976,763	822,038	7,531,288	4,660,547	0	24,990,636
26	Manufacture of computer, electronic and optical products	0	0	0	5,782,133	0	5,782,133
27	Manufacture of electrical equipment	0	1,064,788	5,502,839	3,237,121	0	9,804,748
28	Manufacture of machinery and equipment n.e.c.	403,213	259,795	1,148,460	0	0	1,811,469
29	Manufacture of motor vehicles, trailers and semi-trailers	16,573	871,252	923,535	132,311	1,458,581	3,402,251
30	Manufacture of other transport equipment	0	185,042	0	1,024,790	0	1,209,833
31	Manufacture of furniture	496,700	1,494,912	4,609,477	65,053,754	0	71,654,843
32	Other manufacturing	44,649	430,670	10,370,506	565,223	0	11,411,047
33	Repair and installation of machinery and equipment	395	0	25,336	6,990,410	0	7,016,141
35	Electricity, gas, steam and air conditioning supply	0	36,519,617	341,545,434	918,635,489	296,605,153	1,593,305,693
36	Water collection, treatment and supply	3,977,601	5,308,024	52,362,178	38,854,831	0	100,502,634
38	Waste collection, treatment and disposal activities; materials recovery	0	21,505	745,635	0	0	767,141
	Total	45,222,113.23	200,932,400.79	654,432,379.33	2,483,885,543.31	2,332,548,127.79	5,717,020,564.46

In the manufacturing industry, machinery and equipment were mainly concentrated in four industries at the end of 2013, namely beverages, food, other non-metallic mineral products and textile. Beverages is by far the industry with the highest value in machinery and equipment, and considering the lower number of establishments in the beverages than in the food industries, establishments in the beverage industry have far more machinery and equipment.

While the production technologies deployed in the different industries are themselves very different, their degree of automation is a very good indicator of their level of sophistication. Establishments generally rely on a mix of production technologies with different degrees of automation, while less developed industries and smaller

establishments tend to report a higher dependence on manual technologies. Figure 15 provides a snapshot of the development level of production technologies used in industries across different establishment types. A technological classification is introduced here which ranks establishments according to their mix of production technologies, ranging from high-tech for establishments using "only automated technologies" to low-tech for establishments relying fully on "manual labour". Intermediate levels including semi-automated technologies are also considered.

Figure 15 Production technologies and their degree of automation



Source: Author's technological classification of production technologies

The industrial sector largely consists of establishments equipped with "low-medium-tech" production technologies. They present a certain degree of semi-automation but are largely complemented by manual labour. This is especially the case for small-medium (10-19) and medium (20-49) establishments. However, among these groups, there are also a number of establishments that are more sophisticated in terms of their production technologies. This suggests the presence of a bifurcation among small-medium and medium groups. With regard to medium-large-major establishments, the group of large

establishments consists of more establishments in the high-tech and medium-high-tech segments.

With reference to industry specificity and the varying scope for introducing automated technological solutions, Table 21 provides an overview of the number of establishments with automated, semi-automated and manual production technologies. The figures confirm the dominant role of a few industries, in particular food, beverages and wood products. Interestingly, a significant number of small-medium establishments in the food industry use fully automated systems for production.

Table 21 Production technology (automation)

Level2	Description	Machinery	10-19	20-49	50-99	100-499	500+	Total
05	Mining of coal and lignite	Fully-automated	0	0	1	0	0	1
07	Mining of metal ores	Manual	4	5	0	1	2	12
07		Semi-automatic	7	9	1	1	0	18
07		Fully-automated	1	0	2	0	1	4
08	Other mining and quarrying	Manual	48	58	14	10	0	130
08		Semi-automatic	30	55	13	14	2	114
08		Fully-automated	4	8	1	3	0	16
08		Other	1	0	0	0	0	1
10	Manufacture of food products	Manual	51	38	14	17	6	126
10		Semi-automatic	65	39	21	29	7	161
10		Fully-automated	21	17	8	9	5	60
11	Manufacture of beverages	Manual	2	10	5	6	2	25
11		Semi-automatic	6	6	5	15	2	34
11		Fully-automated	1	3	2	7	1	14
12	Manufacture of tobacco products	Manual	0	0	0	0	2	2
12		Semi-automatic	0	0	0	1	2	3
12		Fully-automated	0	0	0	0	2	2
13	Manufacture of textiles	Manual	1	3	2	4	6	16
13		Semi-automatic	2	3	1	7	6	19
13		Fully-automated	0	0	1	2	1	4
14	Manufacture of wearing apparel	Manual	3	2	1	1	1	8
14		Semi-automatic	4	0	1	1	0	6
14		Fully-automated	0	2	0	0	0	2
15	Manufacture of leather and related products	Manual	3	1	1	2	0	7
15		Semi-automatic	1	2	5	1	0	9
15		Fully-automated	0	0	1	0	0	1
15		Other	0	0	1	0	0	1
16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	Manual	15	5	4	1	2	27
16		Semi-automatic	16	5	3	1	1	26
16		Fully-automated	1	1	1	1	2	6
16		Other	0	1	0	0	0	1
17	Manufacture of paper and paper products	Manual	1	2	1	1	1	6
17		Semi-automatic	0	4	3	2	1	10
17		Fully-automated	0	0	1	1	1	3
18	Printing and reproduction of recorded media	Manual	5	9	2	2	0	18
18		Semi-automatic	7	13	4	6	0	30
18		Fully-automated	2	7	2	1	0	12
18		Other	2	1	0	0	0	3
19	Manufacture of coke and refined petroleum products	Manual	0	0	1	0	0	1
19		Semi-automatic	0	1	1	1	0	3
19		Fully-automated	0	0	0	1	0	1
20	Manufacture of chemicals and chemical products	Manual	8	6	3	6	2	25
20		Semi-automatic	5	4	5	7	2	23
20		Fully-automated	3	0	1	2	1	7
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	Manual	0	0	0	1	0	1
21		Semi-automatic	1	0	1	3	0	5
21		Fully-automated	0	0	0	3	0	3
22	Manufacture of rubber and plastics products	Manual	1	3	5	6	0	15
22		Semi-automatic	6	5	5	13	0	29
22		Fully-automated	2	4	0	3	0	9
23	Manufacture of other non-metallic mineral products	Manual	18	11	1	4	0	34
23		Semi-automatic	16	13	6	4	1	40
23		Fully-automated	3	1	2	2	1	9
24	Manufacture of basic metals	Manual	1	0	0	4	1	6
24		Semi-automatic	1	1	2	3	1	8
24		Fully-automated	0	0	1	2	0	3
25	Manufacture of fabricated metal products, except machinery and equipment	Manual	16	5	4	2	0	27
25		Semi-automatic	13	4	6	3	0	26
25		Fully-automated	1	2	2	0	0	5
26	Manufacture of computer, electronic and optical products	Manual	0	0	0	1	0	1
26		Semi-automatic	0	0	0	1	0	1
26		Fully-automated	0	0	0	1	0	1
27	Manufacture of electrical equipment	Manual	0	1	1	1	0	3
27		Semi-automatic	0	2	2	3	0	7
27		Fully-automated	0	0	0	1	0	1
28	Manufacture of machinery and equipment n.e.c.	Manual	7	1	0	0	0	8
28		Semi-automatic	5	2	1	0	0	8
28		Fully-automated	2	0	1	0	0	3
29	Manufacture of motor vehicles, trailers and semi-trailers	Manual	1	4	0	1	0	6
29		Semi-automatic	0	5	2	1	0	8
30	Manufacture of other transport equipment	Manual	0	1	0	0	0	1
30		Semi-automatic	0	1	0	1	0	2
30		Fully-automated	0	1	0	0	0	1
31	Manufacture of furniture	Manual	21	7	7	3	0	38
31		Semi-automatic	15	6	7	3	0	31
31		Fully-automated	2	1	2	3	0	8
31		Other	1	0	0	0	0	1
32	Other manufacturing	Manual	1	3	2	2	0	8
32		Semi-automatic	0	4	4	2	0	10
32		Fully-automated	0	2	1	1	0	4
33	Repair and installation of machinery and equipment	Manual	2	0	1	1	0	4
33		Semi-automatic	0	0	1	0	0	1
35	Electricity, gas, steam and air conditioning supply	Manual	0	1	1	0	1	3
35		Semi-automatic	0	1	1	1	0	3
35		Fully-automated	0	0	1	0	0	1
35		Other	0	1	1	2	0	4
36	Water collection, treatment and supply	Manual	5	9	7	3	0	24
36		Semi-automatic	11	11	8	4	0	34
36		Fully-automated	7	3	3	2	0	15
36		Other	3	2	0	0	0	5
38	Waste collection, treatment and disposal activities; materials recovery	Manual	0	0	1	0	0	1
38		Semi-automatic	0	0	2	0	0	2
38		Fully-automated	0	1	0	0	0	1

Table 22 Sources of production technology

Level2	ISICREV4_L2.Description	Source	10-19	20-49	50-99	100-499	500+	Total
05	Mining of coal and lignite	Local	0	0	1	0	0	1
07	Mining of metal ores	Imported	6	10	2	1	3	22
07		Local	5	3	1	0	0	9
07		Both	1	1	0	1	0	3
08	Other mining and quarrying	Imported	44	61	17	15	2	139
08		Local	36	54	9	10	0	109
08		Both	3	6	2	2	0	13
10	Manufacture of food products	Imported	91	62	28	44	11	236
10		Local	34	24	12	5	5	80
10		Both	12	8	3	6	2	31
11	Manufacture of beverages	Imported	8	12	6	23	2	51
11		Local	1	3	6	3	2	15
11		Both	0	4	0	2	1	7
12	Manufacture of tobacco products	Imported	0	0	0	1	5	6
12		Both	0	0	0	0	1	1
13	Manufacture of textiles	Imported	2	5	1	8	13	29
13		Local	1	1	2	3	0	7
13		Both	0	0	1	2	0	3
14	Manufacture of wearing apparel	Imported	3	3	1	2	1	10
14		Local	2	1	0	0	0	3
14		Both	2	0	1	0	0	3
15	Manufacture of leather and related products	Imported	3	3	7	1	0	14
15		Local	1	0	1	1	0	3
15		Both	0	0	0	1	0	1
16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	Imported	14	5	4	3	3	29
16		Local	13	6	2	0	1	22
16		Both	5	1	2	0	1	9
17	Manufacture of paper and paper products	Imported	0	5	5	4	2	16
17		Local	1	1	0	0	0	2
17		Both	0	0	0	0	1	1
18	Printing and reproduction of recorded media	Imported	14	22	8	9	0	53
18		Local	2	3	0	0	0	5
18		Both	0	5	0	0	0	5
19	Manufacture of coke and refined petroleum products	Imported	0	1	0	2	0	3
19		Local	0	0	2	0	0	2
20	Manufacture of chemicals and chemical products	Imported	9	7	8	11	4	39
20		Local	4	3	1	1	1	10
20		Both	3	0	0	3	0	6
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	Imported	1	0	1	4	0	6
21		Both	0	0	0	3	0	3
22	Manufacture of rubber and plastics products	Imported	7	9	10	21	0	47
22		Local	1	2	0	1	0	4
22		Both	1	1	0	0	0	2
23	Manufacture of other non-metallic mineral products	Imported	11	10	5	8	2	36
23		Local	22	12	1	2	0	37
23		Both	4	3	3	0	0	10
24	Manufacture of basic metals	Imported	2	1	3	7	2	15
24		Local	0	0	0	2	0	2
25	Manufacture of fabricated metal products, except machinery and equipment	Imported	14	7	10	3	0	34
25		Local	13	3	0	1	0	17
25		Both	3	1	2	1	0	7
26	Manufacture of computer, electronic and optical products	Local	0	0	0	1	0	1
26		Both	0	0	0	2	0	2
27	Manufacture of electrical equipment	Imported	0	2	0	5	0	7
27		Local	0	1	2	0	0	3
27		Both	0	0	1	0	0	1
28	Manufacture of machinery and equipment n.e.c.	Imported	8	2	1	0	0	11
28		Local	6	0	1	0	0	7
28		Both	0	1	0	0	0	1
29	Manufacture of motor vehicles, trailers and semi-trailers	Imported	1	8	2	1	0	12
29		Local	0	1	0	1	0	2
30	Manufacture of other transport equipment	Imported	0	1	0	1	0	2
30		Both	0	2	0	0	0	2
31	Manufacture of furniture	Imported	18	9	10	8	0	45
31		Local	15	4	2	1	0	22
31		Both	6	1	4	0	0	11
32	Other manufacturing	Imported	1	6	5	4	0	16
32		Local	0	3	2	1	0	6
33	Repair and installation of machinery and equipment	Imported	1	0	2	0	0	3
33		Local	0	0	0	1	0	1
33		Both	1	0	0	0	0	1
35	Electricity, gas, steam and air conditioning supply	Imported	0	3	1	2	1	7
35		Local	0	0	0	1	0	1
35		Both	0	0	3	0	0	3
36	Water collection, treatment and supply	Imported	15	18	13	7	0	53
36		Local	6	5	4	2	0	17
36		Both	5	2	1	0	0	8
38	Waste collection, treatment and disposal activities; materials recovery	Imported	0	1	2	0	0	3
38		Both	0	0	1	0	0	1

As regards the origin of these technologies, Table 22 reveals the dependence of these industries on the importation of production technologies. However, while the ratio between locally imported technologies is approximately 1:2 in the mining and quarrying industry, it is higher than 1:3 for other key manufacturing industries. This technological dependence is present across the entire manufacturing sector.

4.5 Dependence on industrial raw materials dependence and backward integration

Raw materials are major inputs to industrial production. They cover the cost incurred by establishments in the same condition as purchased without further processing or transformation. Sources of raw materials used by the establishments are purchased from both domestic and international markets. In 2013, the manufacturing industry was the largest consumer of both raw materials imported from the international markets (TZS 2,501,431 million, 97.9 per cent of total imported raw materials) and insourced locally. The manufacturing industry consumed local raw materials in the amount of TZS 2,105,250 million (66.2 per cent of total local raw materials).

Table 23 provides a more detailed specification of the overall problem manufacturing establishments in Tanzania face, that is, their overdependence on imported raw materials. Among large establishments in manufacturing, 90 per cent of raw materials are imported by large and major establishments (100+ workers), while medium-large establishments import only 7 per cent of the total (against 16 per cent of locally sourced raw materials). For each unit value of raw material imported by medium-large establishments, there are almost two unit values sourced locally.

Table 23 Value of raw material by industry and groups of small-medium and large-major establishments

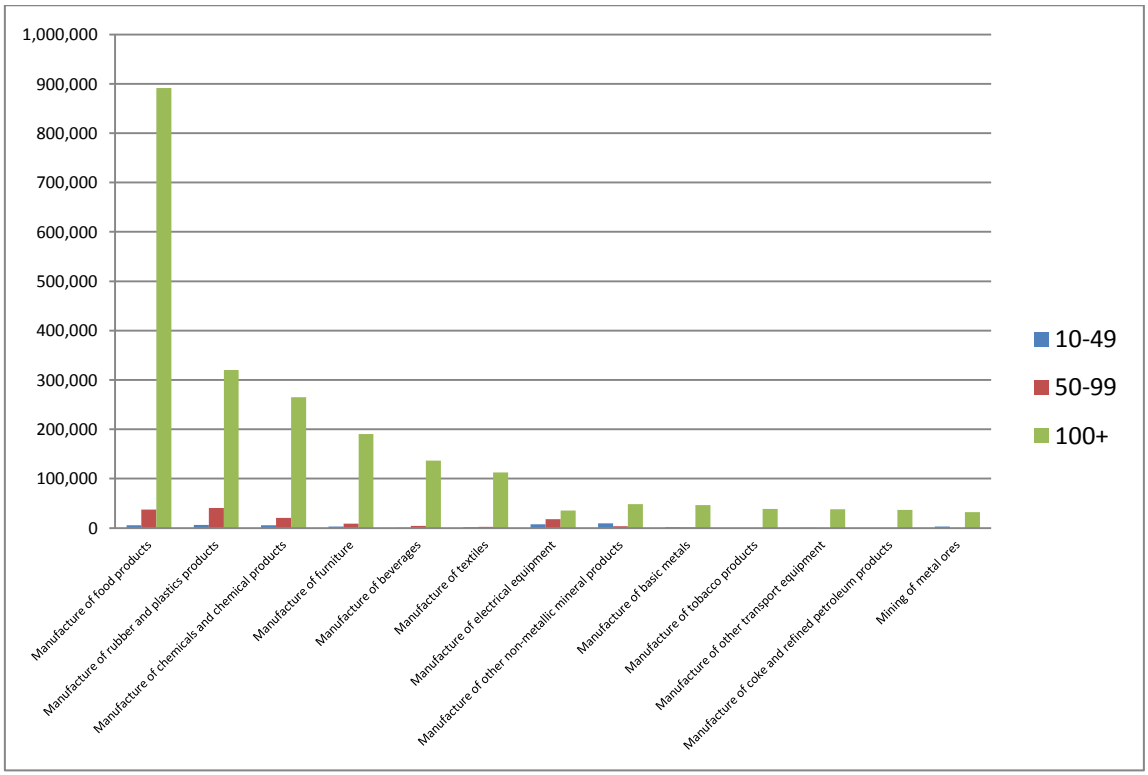
(Tshs Million)

		Imported				Local			
Level2	Description	10-49	50-99	100+	Tot	10-49	50-99	100+	Tot
05	Mining of coal and lignite	0	0	0	0	0	0	0	0
07	Mining of metal ores	2,777	0	31,883	34,659	4,436	89	0	4,525
08	Other mining and quarrying	2	0	6,196	6,198	4,386	653	1,717	6,756
B		**2,779**	**0**	**38,078**	**40,857**	**8,823**	**742**	**1,717**	**11,281**
10	Manufacture of food products	5,319	37,347	891,550	934,216	131,897	130,223	652,206	914,325
11	Manufacture of beverages	273	4,073	136,500	140,846	8,808	36,045	300,811	345,664
12	Manufacture of tobacco products	0	0	38,448	38,448	0	0	149,599	149,599
13	Manufacture of textiles	1,332	2,557	112,273	116,161	2,765	19,172	66,111	88,048
14	Manufacture of wearing apparel	129	0	8,593	8,722	486	109	532	1,127
15	Manufacture of leather and related products	1,888	6,679	2,963	11,530	6,612	10,318	8,028	24,957
16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	814	192	1,690	2,696	8,942	588	10,170	19,700
17	Manufacture of paper and paper products	1,123	1,967	19,495	22,585	6,156	7,447	6,755	20,357
18	Printing and reproduction of recorded media	2,220	14,750	16,028	32,997	19,700	5,784	16,598	42,081
19	Manufacture of coke and refined petroleum products	0	0	36,855	36,855	496	14,216	0	14,712
20	Manufacture of chemicals and chemical products	5,334	20,299	265,217	290,850	2,278	1,630	36,102	40,010
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	975	2,057	30,017	33,050	0	0	1,196	1,196
22	Manufacture of rubber and plastics products	5,999	40,263	320,243	366,505	18,174	1,160	29,111	48,446
23	Manufacture of other non-metallic mineral products	9,295	3,461	48,065	60,821	20,571	9,396	160,087	190,054
24	Manufacture of basic metals	1,792	958	46,585	49,335	2,629	23,095	36,714	62,438
25	Manufacture of fabricated metal products, except machinery and equipment	7,429	12,139	11,986	31,554	7,521	8,398	24,587	40,505
26	Manufacture of computer, electronic and optical products	0	0	4,290	4,290	0	0	0	0
27	Manufacture of electrical equipment	7,511	18,013	35,555	61,079	1,970	4,138	6,249	12,357
28	Manufacture of machinery and equipment n.e.c.	1,157	0	0	1,157	4,236	0	0	4,236
29	Manufacture of motor vehicles, trailers and semi-trailers	1,637	5,964	0	7,601	6,297	2,380	4,693	13,371
30	Manufacture of other transport equipment	449	0	37,871	38,320	501	0	0	501
31	Manufacture of furniture	3,049	8,977	190,441	202,467	3,005	34,734	2,984	40,723
32	Other manufacturing	1,343	3,314	4,689	9,345	1,141	27,836	212	29,189
33	Repair and installation of machinery and equipment	0	0	0	0	149	1,371	132	1,651
C		**59,068**	**183,010**	**2,259,354**	**2,501,431**	**254,334**	**338,040**	**1,512,876**	**2,105,250**
35	Electricity, gas, steam and air conditioning supply	0	0	11,910	11,910	17,595	25,774	1,004,770	1,048,139
D		0	0	11,910	11,910	17,595	25,774	1,004,770	1,048,139
36	Water collection, treatment and supply	326	0	0	326	5,847	4,447	4,411	14,706
38	Waste collection, treatment and disposal activities; materials recovery	0	399	0	399	1,021	888	0	1,909
E		326	399	0	724	6,868	5,335	4,411	16,615
	Total	62,172	183,408	2,309,342	2,554,923	287,620	369,891	2,523,774	3,181,285

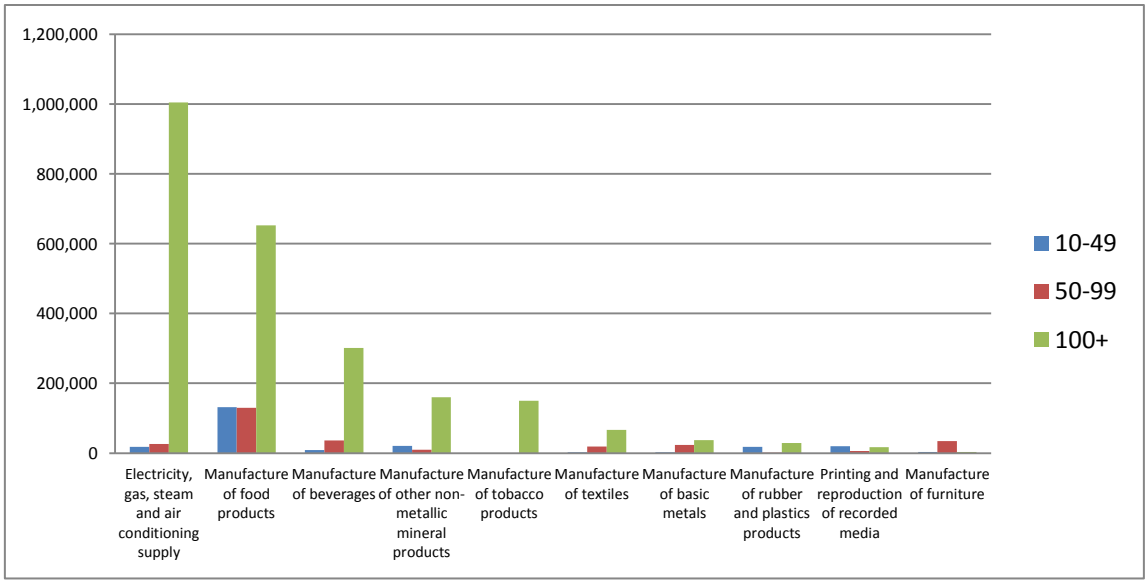
By contrast, for each unit value of locally sourced raw materials for large and major establishments, we find a 1.5 unit value of imported raw materials. There are, however, few exceptions. For example, large and major establishments in the manufacturing of beverages source locally double of what they import, while in the case of manufacturing of other non-metal products, the ratio is 1:3; for tobacco, the ratio is almost 1:4.

Figure 16 **Value of raw materials purchase by industrial activities from foreign and local markets by establishment types**

a) Value of imported raw materials



b) Value of raw materials from local markets



4.6 Tax contribution by industry and employment size

The manufacturing industry contributes 85 per cent of income tax, while the mining and quarrying industry only contributes 8 per cent (Table 24). Within manufacturing, the manufacture of beverages is by far the biggest contributor with 40 per cent of income tax (equal to 35 per cent of total income tax collected in the country). This is followed by tobacco (18 per cent), non-metallic mineral products (16 per cent) and food (12 per cent). Within manufacturing, large establishments (100-499 workers) are by far the biggest contributor with 60 per cent of income tax (50 per cent of the total income tax collected in Tanzania). The major manufacturing establishments (500+ workers) contribute 37 per cent.

Table 24 Income tax by industry and establishment type

							(Million Tshs)
ISIC Rev 4	Industrial Activity	**10 - 19**	**20-49**	**50-99**	**100-499**	**500+**	Total
05	Mining of coal and lignite	0	0	0	0	0	0
07	Mining of metal ores	10	17	8	1,930	14,077	16,042
08	Other mining and quarrying	87	150	2,803	241	1,155	4,436
B		97	167	2,812	2,171	15,232	20,478
10	Manufacture of food products	168	682	866	6,619	16,539	24,875
11	Manufacture of beverages	105	20	343	72,797	10,874	84,140
12	Manufacture of tobacco products	0	0	0	0	38,274	38,274
13	Manufacture of textiles	48	36	9	413	2,641	3,147
14	Manufacture of wearing apparel	18	7	0	0	0	25
15	Manufacture of leather and related products	3	53	46	447	0	549
16	manufacture of articles of straw and plaiting materials	47	763	49	16	8,153	9,029
17	Manufacture of paper and paper products	1	4	45	0	0	49
18	Printing and reproduction of recorded media	34	579	60	382	0	1,056
19	Manufacture of coke and refined petroleum products	0	9	29	0	0	38
20	Manufacture of chemicals and chemical products	217	0	144	1,538	741	2,640
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	15	0	0	1,591	0	1,606
22	Manufacture of rubber and plastics products	139	26	132	608	0	905
23	Manufacture of other non-metallic mineral products	69	98	22	33,461	0	33,651
24	Manufacture of basic metals	6	2	32	339	453	833
25	Manufacture of fabricated metal products, except machinery and equipment	84	67	74	0	0	225
26	Manufacture of computer, electronic and optical products	0	0	0	382	0	382
27	Manufacture of electrical equipment	0	0	4	80	0	85
28	Manufacture of machinery and equipment n.e.c.	11	19	0	0	0	30
29	Manufacture of motor vehicles, trailers and semi-trailers	0	27	0	0	0	27
30	Manufacture of other transport equipment	0	15	0	0	0	15
31	Manufacture of furniture	48	13	153	3,537	0	3,751
32	Other manufacturing	0	17	129	35	0	181
33	Repair and installation of machinery and equipment	0	0	0	0	0	0
C		1,013	2,438	2,138	122,246	77,676	205,511
35	Electricity, gas, steam and air conditioning supply	0	0	13,865	0	0	13,865
D		0	0	13,865	0	0	13,865
36	Water collection, treatment and supply	6	5	330	250	0	591
38	Waste collection, treatment and disposal activities; materials recovery	0	0	41	0	0	41
E		6	5	371	250	0	633
	Total	1,116	2,609	19,186	124,668	92,908	240,487

Table 25 reveals a similar pattern in terms of net value added tax paid. However, while the manufacturing industry remains the largest contributor with 66 per cent of net value added tax paid, the mining and quarrying industry contributes a larger share of net value added tax paid than income tax. The net value added tax paid by mining and quarrying is equal to 33 per cent of the total in Tanzania, and is exclusively contributed by major establishments. In the case of manufacturing, medium establishments contribute the most (50 per cent against 44 per cent of major manufacturing establishments).

Table 25 Net value added tax by industry and establishment type

							(Million Tshs)
ISIC Rev 4	Industrial Activity	**10 - 19**	**20-49**	**50-99**	**100-499**	**500+**	Total
05	Mining of coal and lignite	0	0	0	0	0	0
07	Mining of metal ores	0	2	0	0	138,949	138,952
08	Other mining and quarrying	87	171	95	241	257	851
B		87	174	95	241	139,206	139,803
10	Manufacture of food products	96	1,629	2,360	8,343	25,844	38,272
11	Manufacture of beverages	47	246	2,836	91,169	28,939	123,236
12	Manufacture of tobacco products	0	0	0	0	63,324	63,324
13	Manufacture of textiles	160	3	15	1,640	24	1,842
14	Manufacture of wearing apparel	3	12	0	0	0	14
15	Manufacture of leather and related products	0	0	19	8	0	27
16	Manufacture of wood and of products of wood and cork, except furniture; manu	4	36	660	0	1,723	2,422
17	Manufacture of paper and paper products	1	30	98	0	214	344
18	Printing and reproduction of recorded media	14	192	98	66	0	370
19	Manufacture of coke and refined petroleum products	0	0	0	0	0	0
20	Manufacture of chemicals and chemical products	363	3	240	811	0	1,417
21	Manufacture of basic pharmaceutical products and pharmaceutical preparatior	0	0	0	0	0	0
22	Manufacture of rubber and plastics products	3	94	1,147	678	0	1,922
23	Manufacture of other non-metallic mineral products	211	163	228	31,845	3	32,450
24	Manufacture of basic metals	15	0	28	2,591	2,982	5,616
25	Manufacture of fabricated metal products, except machinery and equipment	234	9	326	1,075	0	1,645
26	Manufacture of computer, electronic and optical products	0	0	0	45	0	45
27	Manufacture of electrical equipment	0	0	0	0	0	0
28	Manufacture of machinery and equipment n.e.c.	0	1	0	0	0	1
29	Manufacture of motor vehicles, trailers and semi-trailers	0	8	0	0	0	8
30	Manufacture of other transport equipment	0	0	0	0	0	0
31	Manufacture of furniture	5	2	0	1,640	0	1,647
32	Other manufacturing	0	102	13	75	0	190
33	Repair and installation of machinery and equipment	0	0	0	0	0	0
C		1,155	2,529	8,069	139,986	123,052	274,790
35	Electricity, gas, steam and air conditioning supply	0	0	0	0	0	0
D		0	0	0	0	0	0
36	Water collection, treatment and supply	13	24	156	0	0	192
38	Waste collection, treatment and disposal activities; materials recovery	0	0	110	0	0	110
E		13	24	265	0	0	302
	Total	1,254	2,726	8,429	140,227	262,258	414,895

Finally, Table 26 shows that the manufacturing industry is by far the main tax contributor with 98 per cent contribution to total other taxes. In particular, the beverages industry alone contributes 79 per cent of total other taxes in Tanzania. These figures

confirm the critical role of the manufacturing industry in terms of contribution to tax revenues and thus, fiscal spending by the government.

Table 26 Other tax on production by industry and establishment type

						(Million Tshs)	
ISIC Rev 4	Industrial Activity	10 - 19	20-49	50-99	100-499	500+	Total
05	Mining of coal and lignite	0	0	0	0	0	0
07	Mining of metal ores	3	6	3	8	951	970
08	Other mining and quarrying	113	131	280	588	383	1,496
B		116	137	283	596	1,334	2,466
10	Manufacture of food products	617	1,569	1,162	1,104	3,163	7,616
11	Manufacture of beverages	22	162	15,302	43,434	46,356	105,277
12	Manufacture of tobacco products	0	0	0	89	1,700	1,789
13	Manufacture of textiles	3	9	17	50	986	1,065
14	Manufacture of wearing apparel	12	19	0	0	41	72
15	Manufacture of leather and related products	2	9	21	23	0	54
16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of a	29	24	175	0	123	351
17	Manufacture of paper and paper products	1	23	68	24	632	749
18	Printing and reproduction of recorded media	39	97	27	128	0	292
19	Manufacture of coke and refined petroleum products	0	2	68	41	0	111
20	Manufacture of chemicals and chemical products	103	20	18	356	1,845	2,342
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	0	0	46	224	0	270
22	Manufacture of rubber and plastics products	302	114	82	639	0	1,138
23	Manufacture of other non-metallic mineral products	102	308	75	385	178	1,048
24	Manufacture of basic metals	8	1	46	168	0	223
25	Manufacture of fabricated metal products, except machinery and equipment	46	12	121	6	0	185
26	Manufacture of computer, electronic and optical products	0	0	0	33	0	33
27	Manufacture of electrical equipment	0	36	28	55	0	120
28	Manufacture of machinery and equipment n.e.c.	7	4	0	0	0	11
29	Manufacture of motor vehicles, trailers and semi-trailers	1	19	8	42	0	70
30	Manufacture of other transport equipment	0	0	0	152	0	152
31	Manufacture of furniture	48	24	102	257	0	431
32	Other manufacturing	23	6	6,829	18	0	6,876
33	Repair and installation of machinery and equipment	12	0	20	0	0	32
C		1,379	2,456	24,216	47,229	55,024	130,304
35	Electricity, gas, steam and air conditioning supply	0	3	11	0	0	14
D		0	3	11	0	0	14
36	Water collection, treatment and supply	23	11	36	31	0	102
38	Waste collection, treatment and disposal activities; materials recovery	0	9	126	0	0	135
E		23	20	162	31	0	236
	Total	1,518	2,616	24,672	47,857	56,358	133,020

5. Concluding remarks

Tanzania is a fast growing economy, with growth rates above the average figures for sub-Saharan Africa since 2005, a stable though evolving political settlement, and robust macroeconomic performance. While two-thirds of the population are still employed in the agricultural sector, initial signs of productive transformation have been registered over the last years. The food and beverages industries, some agro-businesses and manufacturing industries, connected also to the large mining industry, have been gaining some traction in domestic and export markets, while creating formal employment opportunities.

Despite some encouraging performance figures and the country's tremendous growth potential, Tanzania faces multiple challenges that constrain its structural transformation and overall poverty reduction. Building on the census of industrial production, the paper highlights a number of these constraints as well as opportunities across different industries of the economy and region. More critically, the adoption of a new taxonomy distinguishing seven different types of establishments revealed the structural heterogeneity characterizing Tanzania's industrial sector, in particular the extreme differences in industrial performance and drivers across the "establishment types spectrum".

Tanzania's industrial system has a dualist structure, with a high concentration of industrial activities in a few industries and regions, and a limited number of large-major establishments, while a vast group of micro-small establishments remain largely excluded from value added processes, scaling-up opportunities and market access. The limited number of medium sized enterprises—the so called "missing middle"—makes it even more difficult to rebalance this dualist structure, and leaves these two opposite and heterogeneous sets of industrial establishments delinked. The disarticulation of the industrial system and its lack of domestic backward and forward linkages is also revealed both by industrial performance indicators and industrial drivers, such as the high degree of dependence on imports or the concentration in value added processes.

The analysis of the various challenges (and opportunities) these different types of establishments face is a first step towards more targeted and effective industrial policy

interventions. For example, recognition of the fact that chronic underutilization of production capacity or skills gaps are particularly acute among specific establishment types within the same industry or region, indicates the importance of introducing tailored policies. Some of these could boost small firms with a "medium size" potential, while other policies could focus on coordinating an incremental reduction in import dependence of specific commodities with an increase of production capacity utilization of capable domestic firms.

Indeed, some of these interventions might rely on supply side as well as demand side measures. Local and regional markets, for example, can offer opportunities for incremental development in terms of increasing product quality, reaching effective production scale, engaging in technological absorption and capabilities development activities. The use of public procurement or infant industry protection, combined with export and productivity-enhancing incentives, can modify the existing incentive structure and support the emergence of new productive organizations.

Policy learning around these industrial development strategies depends on multiple diagnostics. Some of these allow policymakers to map out the industrial structure at different points in time, other diagnostics are meant to support policymakers in monitoring changes in the industrial structure and evaluating the achievement of certain development outcomes. The application of the statistical and analytical framework introduced in this paper to the longitudinal analysis of the evolution of Tanzania's industrial system over the last decade promises to shed further light on and foster the industrial policy discussion in Tanzania.

A first application of this framework to the development of a "Results Matrix" for the monitoring and evaluation of Tanzania's Five Year Development Plan is proposed in the Appendix. The battery of indicators was used to build a multi-level monitoring and evaluation framework, involving the macro (country), meso (industries and regions) and micro (firm types) levels of analysis. In moving beyond the snapshot offered in this paper for the year 2013, an application of this monitoring and evaluation framework could reveal the extent to which sectoral policies and other targeted interventions are transforming Tanzania's industrial system over time, the entry-exit dynamics in the different industries, and the building of linkages towards a more integrated local production system.

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Appendix

Monitoring and Evaluation Framework for 5Year Development Plan: A proposal

Background

The Five Year Development Plan acknowledges the importance of equipping policymakers with a Monitoring and Evaluation (M&E) framework able to support the full policy cycle as well as the ongoing dialogue among public and private stakeholders. The existing framework is based on the Government-wide Monitoring System (GMS). It thus sets up an institutional arrangement and responsibilities for the implementation of the M&E framework.

Three categories of evaluations are considered: annual, mid-term and end of the planning horizon. Thus, two rigorous and comprehensive evaluations, namely the mid-term and the end of period evaluations are planned. The M&E framework also relies on more detailed diagnostic work to provide more insights into the constraints that economic agents face in realizing economic opportunities.

The M&E framework is expected to involve both general and specific objective indicators and shall be realized at the macro, meso (industry and cross-cutting interventions) and micro (project or intervention) levels. Given the Five Year Development Plan's main target areas, the M&E framework is organized around a results matrix which, among others, will include the following set of indicators:

(i) Indicators associated with aspects of industrialization and economic transformation;

(ii) Indicators associated with human development;

(iii) Indicators associated with policies that remove constraints to promote economic transformation;

(iv) Indicators associated with ways of working and institutional development (improvement of service delivery).

Given the importance of industry and the employment channel, the FYDP assigns particular relevance to the data on industrial production, employment and wage

disaggregated by gender and locality. Some of the indicators in the results matrix include:

(i) Unemployment rate (disaggregated) such as rural vs. urban; farm vs. non-farm, formal vs. informal; wage vs. own income; gender; socio-economic groups, etc.;

(ii) Labour force participation rate and labour productivity (GDP per worker), GDP per capita disaggregated as far as practically possible along (i);

(iii) Poverty levels (various indices) and inequities such as proportion of income earned by the bottom quintile; farm yield disaggregated as far as feasibly possible along (i), etc.;

(iv) Manufacturing value added (MVA), exports (measured in volume and value) indicating level of value added/processing, non-traditional exports); destination and sophistication;

(v) Savings and investment rate; data on savings and gross fixed capital formation (the latter disaggregated by key industries) – disaggregated by public sector and private sector categories.

Data availability and reliability are critical for establishing a coherent system of indicators covering the different dimensions identified in the results matrix, also taking into consideration different levels of data aggregation and units of analysis/measure. In this regard, a number of technical and implementation challenges have been identified affecting the translation of the framework into a system of indicators and their implementation. In particular, the 5YDP highlights the "insufficient capacity with respect to staffing and specific technical expertise to identify and disaggregate available data (such as by locality and socio-economic groups; at sub national levels), and adequately coordinate, manage and report new data among the multiple partners that are involved in implementing the national development agenda and policies".

Some proposals based on the present study

The present study addresses the highlighted challenges and the results matrix in two ways. First, it constructs a number of indicators based on the Census of Industrial Production, which is compatible with the Annual Survey of Industrial Production conducted by the National Bureau of Statistics (NBS) in collaboration with UNIDO. Second, it directly addresses one of the main challenges highlighted in the 5YDP, that is, the problems associated with data disaggregation in the industrial sector. By mapping establishments by industry, size and region, new insights on Tanzania's industrial sector have been extracted.

The following table introduces a number of indicators developed in this paper and in the Tanzania Industrial Competitiveness Report 2015 produced by the Ministry of Industry, Trade and Investment in collaboration with NBS in a systematic way. The indicators are organized along two main axes – one related to the dimensions selected in the M&E strategy and one related to the timeline of the M&E activities (annual, mid-term and end). We focus on the dimension associated with aspects of industrialization and economic transformation by organizing the indicators within this dimension for different levels of aggregation (macro, meso and micro). Finally, the data sources for each indicator are also reported.

Table 27 M&E system of indicators for the Five Year Development Plan

Results matrix dimensions	Levels of aggregation	Annual (level & AGR)	Annual (level & AGR)	Mid-term (level & 3YGR)	Annual final (level/stock & 5YGR)
Industrialization and economic transformation					
Data source	**Macro-level** (country-level industrial competitiveness and drivers performance – also possibility of regional level M&E))				
ASIP / UNIDO	1	Industrial value added			Industrial value added
ASIP / UNIDO	2	Manufacturing value added			Manufacturing value added
ASIP / UNCTAD	3	Manufacturing exports in total			Manufacturing exports in total
ASIP / UNCTAD	4	Import dependence (L/I)			Import dependence (L/I)
ASIP / UNIDO	5	Industrial employment			Industrial employment
ASIP	6	Skilled employment in total			Skilled employment in total
ASIP / UNIDO	7	Productivity per industrial establishment			Productivity per industrial establishment
ASIP	8	Production capacity utilization			Production capacity utilization
ASIP	9	Machinery & equipment value			Machinery & equipment value
ASIP	10	Number of SME establishments			Number of SME establishments
	Meso-level (sectoral-level industrial competitiveness and drivers performance – also possibility of regional level M&E)				
ASIP / UNIDO	1	Industrial value added per industry (excl. manufacturing)			Industrial value added per industry (excl. manufacturing)
ASIP / UNIDO	2	Manufacturing value added per industry			Manufacturing value added per industry
ASIP / UNCTAD (Lall classification)	3	Manufacturing exports per R-L-M-H products			Manufacturing exports per R-L-M-H products
ASIP / UNCTAD	4	Import dependence (L/I) per			Import dependence (L/I) per

		manufacturing industry	manufacturing industry
ASIP / UNIDO	5	Industrial employment per manufacturing industry	Industrial employment per manufacturing industry
ASIP	6	Skilled employment per manufacturing industry	Skilled employment per manufacturing industry
ASIP / UNIDO	7	Productivity of establishment per industry	Productivity of establishment per industry
ASIP	8	Production capacity utilization per manufacturing industry	Production capacity utilization per manufacturing industry
ASIP	9	Machinery & equipment value per manufacturing industry	Machinery & equipment value per manufacturing industry
ASIP	10	Number of SME establishments per manufacturing industry	Number of SME establishments per manufacturing industry
	Micro-level (sectoral level per establishment type 10+ industrial competitiveness and drivers performance – also possibility of regional level M&E)		
ASIP / CIP Map	1	Industrial value added per industry (excl. manufacturing) & establ. type	Industrial value added per industry (excl. manufacturing) & establ. type
ASIP / CIP Map	2	Manufacturing value added per industry & establ. type	Manufacturing value added per industry & establ. type
ASIP / CIP Map	3	Manufacturing exports per R-L-M-H products & establ. type	Manufacturing exports per R-L-M-H products & establ. type
ASIP / CIP Map	4	Import dependence (L/I) per manufacturing industry & establ. type	Import dependence (L/I) per manufacturing industry & establ. type
ASIP / CIP Map	5	Industrial employment per manufacturing industry & establ. type	Industrial employment per manufacturing industry & establ. type
ASIP / CIP Map	6	Skilled employment per manufacturing indutry & establ. type	Skilled employment per manufacturing industry & establ. type

ASIP / CIP Map	7	Productivity of establishment per industry & establ. type	Productivity of establishment per industry & establ. type
ASIP / CIP Map	8	Production capacity utilization per manufacturing industry & establ. type	Production capacity utilization per manufacturing industry & establ. type
ASIP / CIP Map	9	Machinery & equipment value per manufacturing industry & establ. type	Machinery & equipment value per manufacturing industry & establ. type
UNIDO/ UNCTAD	10	GVC upgrading index for targeted industrial sectors	GVC upgrading index for targeted industrial sectors

Source: Author

Note on Data sources:

ASIP: Annual Survey of Industrial Production (NBS)

UNIDO: Industrial Statistics INDSTAT

UNCTAD: UN ComTrade

CIP Map: Mapping of Industrial Production Study

Lall Technological classification

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